

2870 Rogue Series Owner's Manual

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WELCOME ABOARD!!

Welcome to the Cruiser family of happy boat owners.

First off, we wish to thank you for making our **2870 Series Boat** your recreational choice for boating enjoyment. Extensive design and engineering research went into the development of the **2870 Series Boat**; and we feel that there is a beautiful balance between structural integrity and creature comforts.

You should know that your boat was manufactured by trained craftsmen in the tradition of meeting or exceeding existing safety and quality standards established by the U.S. Coast Guard and the Boating Industry of America.

Cruisers has been manufacturing boats for over 40 years. We take pride in our craftsmanship and hull performance. We are confident you will enjoy the ride. For you, the Cruisers name is your assurance that your boat will hold its value while providing many years of boating pleasure. We have made a commitment to this industry and are glad to have you as a partner.

Congratulations on your choice – let us know if we can be of further service.



SKIPPER'S KIT

The skipper's kit contains the 2870 Rogue Series Boat owner's manual. Along with the owner's manual, there is one envelope which includes information about onboard systems and components furnished by suppliers other than Cruisers.

Owner's Manual, 2870 Rogue Series Boats

Spend some time looking through this manual. It contains information concerning the operation and care of your boat. The descriptions contained within the manual will introduce you to the features of the boat, and provide you with a general knowledge of how the equipment works. The manual is divided into ten sections, and each section is introduced by a table of contents to help you quickly find needed information. Become familiar with the material in each section before operating your boat.

Throughout the manual you will come across safety precautions labeled **▲ WARNING** or **▲ CAUTION**. **WARNINGS** indicate hazards or unsafe practices which could result in personal injury or death. **CAUTIONS** indicate situations which could result in damage to the boat and its various systems.

Section 1 contains a description of the skipper's kit and information about the warranty.

Section 2 contains boat specifications such as dimensions and capacities. There are also layout diagrams to introduce you to floorplans as well as the locations of various components.

Section 3 contains descriptions of all the controls and indicators on the dash of the helm.

Section 4 contains principles of operation for the major systems onboard the 2870 Rogue Series Boats. Look in this section for electrical schematics.

Section 5 contains instructions for operating the boat. The section begins with safety information which is "must" reading.

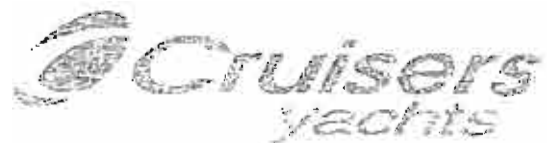
Section 6 contains maintenance instructions for services that need to be performed on a regular basis.

Section 7 contains instructions for storing the boat for extended periods of time, and prep instructions for after storage.

Section 8 contains information about the care of your boat, and how to repair minor damage.

Section 9 contains information about the standard and optional accessory items which complement your new Cruisers boat.

Section 10 contains a brief troubleshooting section.

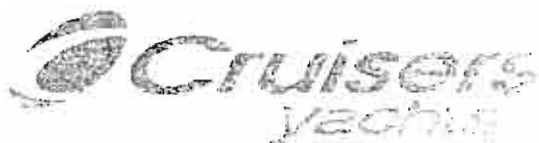


Owner's Manuals and Pamphlets, Systems and Components [Envelope]

Spend some time becoming familiar with all the information contained in the envelope, because this information is not duplicated in your 2870 Rogue Series Owner's Manual. Besides containing separate warranty information, the envelope contains manuals and pamphlets which provide important safety, operating, and maintenance instructions for those systems and components not manufactured by Cruisers. Depending on the options you chose the envelope may contain some or all of the following manuals:

AVAILABLE FEATURES

- Engine Operation/Maintenance - Electric Schematic
- DC Panel Information Packet
- Electric Stove
- AC Panel Information
- AC Powered Battery Charger Manual
- Hot Water Heater Manual
- Trim Planes Manual
- Refrigerator User Manual
- Stereo System Operation Manual
- Compass Manual
- Gas Fume Detector Manual
- Manual Marine Toilet Manual
- Halon Automatic Fire Extinguisher Information
- Generator Operation/Maintenance
 - Electrical Schematics
 - Service Centers Directory
- Air Conditioner Information Packet
- Microwave User Manual



WARRANTY INFORMATION

Warranties for onboard systems and components furnished by suppliers other than Cruisers, are located in the envelope inside the skipper's kit. Your Cruisers Dealer will go through these with you. It is your responsibility to fill out any warranty registration that may be required.

The warranty provided by Cruisers is printed on the last page of this manual. You and the Cruisers Dealership have certain responsibilities to fulfill to keep the warranty in force.

Dealership Responsibilities

1. The dealer will discuss the terms of all warranties, and stress the importance of registering warranties with the appropriate manufacturers.
2. The dealer will provide instruction for obtaining warranty service.
3. The dealer will go over the predelivery service record with you, and then sign it to certify that all work has been accomplished.
4. The dealer will provide you with a thorough instruction in the operation of your boat and all its systems.

Your Responsibilities

1. Sit down with the dealer and go over all warranties. Fill in the Cruisers limited warranty registration card which is located in an envelope inside the skipper's kit. Keep a record of the hull number for future reference.
2. Inspect the boat at the time of delivery to ensure that all systems are operating properly.
3. Sit down with the dealer and go over the predelivery service record. Sign this record to indicate that it has been explained to you.
4. Operate all equipment per the manufacturer's instructions.
5. Cruisers recommends that you refer to your engine warranty for initial inspection and service requirements.
6. Perform or provide for the appropriate periodic maintenance outlined in the owner's manuals and service guides.

Warranty Service

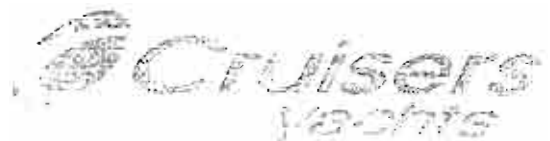
You are entitled to all the benefits and services set down in the warranties. If a problem arises with your Cruisers boat as a result of workmanship or materials, contact your Cruisers dealer as soon as possible. Please have your hull identification number, and necessary model numbers on hand for the items that may need service or repair. Your hull identification number is located below the rub rail on the starboard side of the transom.



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SPECIFICATIONS

Dimensions

L.O.A. with Integrated Swim Platform	28'-6"/8.69 m
L.O.A. with Integrated Swim Platform and Optional Extended Swim Platform	31'-0"/9.4 m
Beam	10'-0"/3.05 m
Approximate Weight, (Lbs) (Gas)	8,500#/3,850 K
Approximate Weight, (Lbs) (Diesel)	8,800#/3,986 K
Fuel Capacity - U.S. Gallons	110 Gal/416 L.
Water System Capacity - U.S. Gallons	30 Gal/113 L.
Waste Holding Capacity - U.S. Gallons	20 Gal/75 L.
Cabin Headroom	6'-3"/1.90 m
Height - Keel to Top of Windshield	9'-3"/2.82 m
Height - Keel to Top of Arch	10'-8"/3.25 m
Draft (Stern Drive Down)	35"/89 Cm
Draft (Stern Drive Up)	20"/51 Cm
Bridge Clearance	7'-7"/2.31 m

Engine Options

Stern Drive, Mercruiser

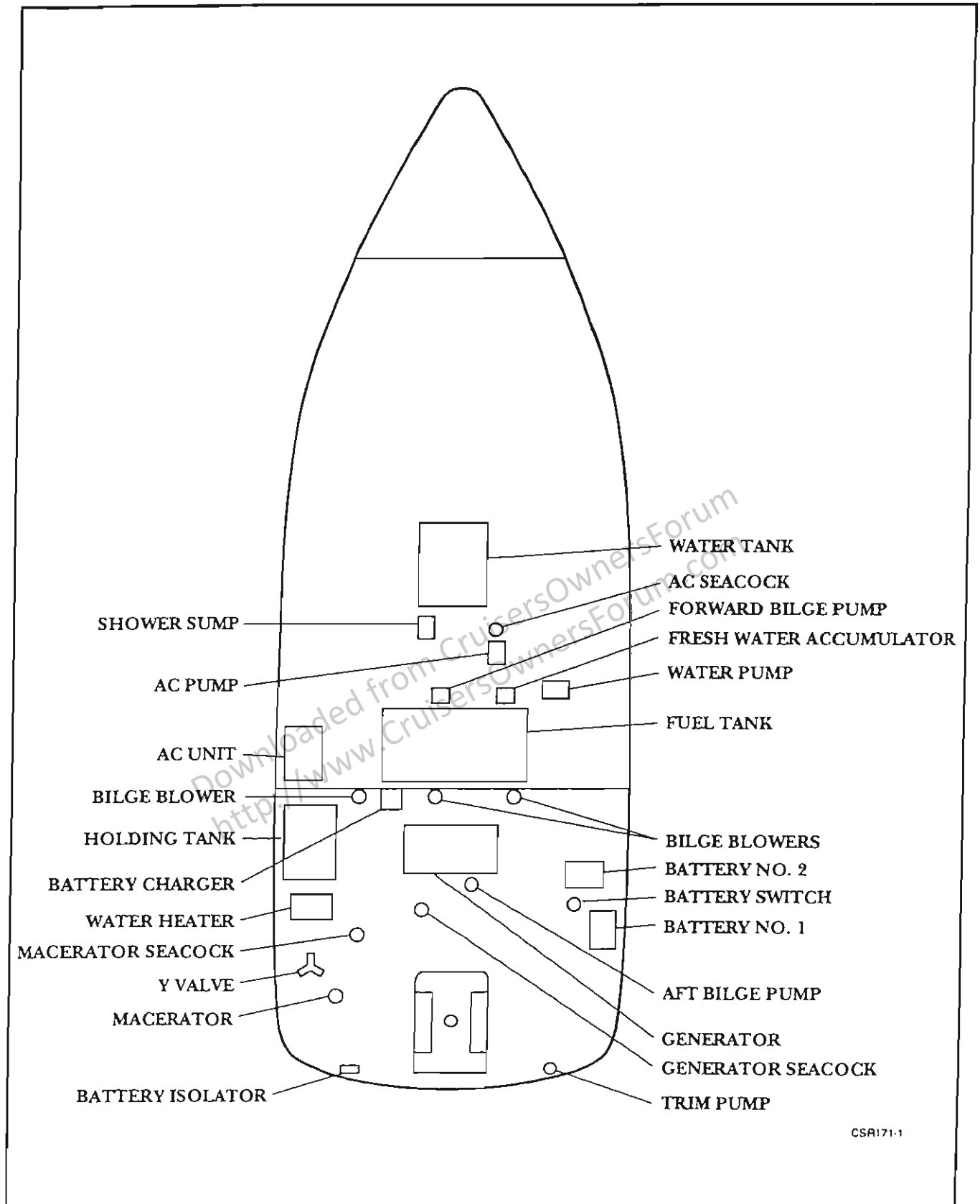
7.4 L, MPI, 300 HP (244 Kw) I/O, Bravo III Drive
T 5.0 L, 220 HP (164 Kw), I/O, Alpha Drives
T 5.7 L, 250 HP (186 Kw), I/O, Alpha Drives Counter Rotating
T 5.7 L, 250 HP (186 Kw), I/O, Bravo III Drives
T 5.7 L, EFI, 260 HP (193 Kw), I/O Alpha Drives, Counter Rotating
T 5.7 L, EFI, 260 HP (193 Kw), I/O Bravo III Drives
T 350 Mag, MPI, 300 HP (224 Kw), Bravo III Drives
D 4.2 L, 200 HP (148 Kw) Diesel I/O Bravo III Drive
D 4.2 L, D Tronic, 225 HP (167 Kw), Diesel I/O Bravo II Drive

Stern Drive, Volvo

7.4 GI, DP, 300 HP (224 Kw), I/O
T 5.0 GL, DP, 220 HP (164 Kw), I/O
T 5.7 GS, DP, 225 HP (186 Kw), I/O
KAMD43, DP, 216 HP (159 Kw), Diesel I/O
T TAMD31P, DP, 139 HP (103 Kw), Diesel I/O



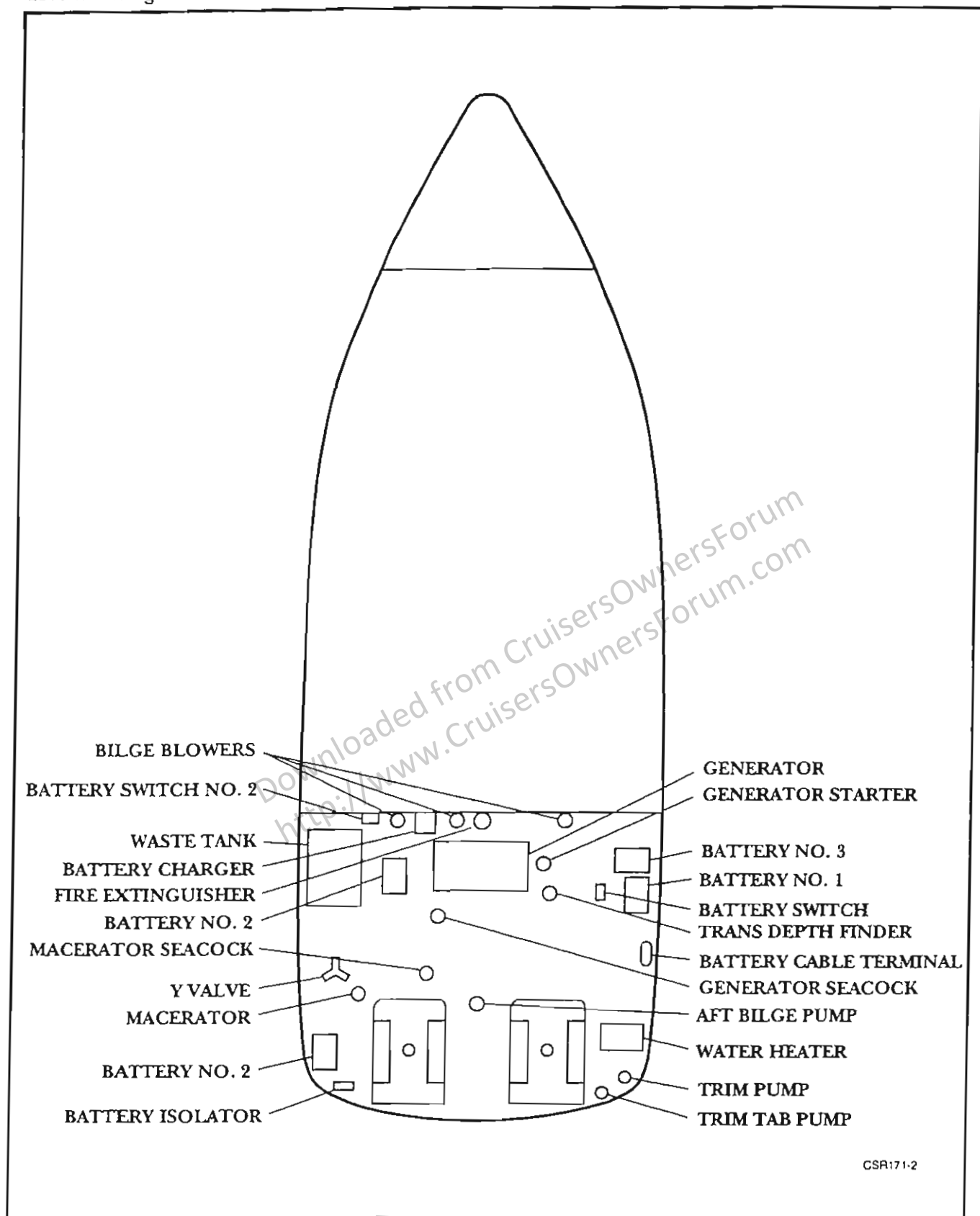
GENERAL LAYOUT 2870 Single Engine



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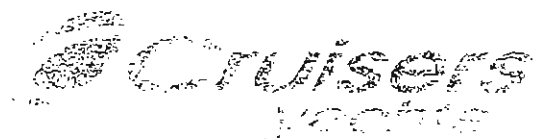
GENERAL LAYOUT

2870 Twin Engine



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DASH LAYOUT

Key to Dash Layout

COMPASS

The compass has not been compensated. The compensating should be performed by a qualified compass adjuster. After the compass has been adjusted, do not allow any iron or steel objects to be placed in its vicinity - even temporarily. Refer to the owner's manual included in the Skipper's Kit for detailed information.

SPEEDOMETER

The speedometer registers boat speed relative to the water.

FUEL GAUGE

IMPORTANT

Do not rely on the accuracy of gauge. The reading is only approximate, and should always be compared to the hours of use multiplied by the known fuel consumption (GPH).

The fuel gauge indicates the approximate amount of fuel in the tank.

ENGINE TEMPERATURE GAUGES

The port and starboard engines each have their own temperature gauge. The engine temperature gauges indicate cooling water temperature inside the engines. Normally the gauge will register between 170°F and 195°F. Consult engine owner's manual if gauge registers outside of this range.

OIL PRESSURE GAUGES

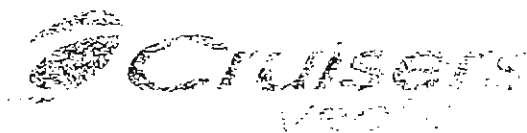
The port and starboard engines each have their own oil pressure gauge. The engine oil pressure gauges indicate the pressure of the lubricating oil inside the engines. Make a note of the oil pressure reading when the boat is new; this can be considered your engine's normal oil pressure. Fluctuations will occur in the pressure under different operating speeds, but major deviations may signal problems. If pressure drops radically or is not registering, turn the engines off and consult your dealer.

ENGINE TACHOMETERS

The port and starboard engines each have their own tachometer gauge. The tachometers register engine crankshaft RPM's. Propeller shaft RPM's are approximately one half of engine crankshaft RPM's. Refer to your engine owner's manual for the appropriate engine speed.

VOLTMETERS

The port and starboard engines cranking battery each have their own voltmeter. Normal operating voltage, when engine is at 1000 plus RPM's, is between 12.0 and 15.5 volts. Higher or lower readings would indicate that there is a problem. Refer to your engine owner's manual for details, and refer the problem to your Cruisers dealer.



POWER TRIM GAUGES

The port and starboard engines each have their own power trim gauge. These gauges indicate the position of the engine out drives. Refer to your engine owner's manual for details.

HORN SWITCH

Press the top half of the switch to sound the horn. The horn is protected by a resettable circuit breaker located on the dash circuit breaker panel.

BOARDING LIGHTS SWITCH

Push the top of the rocker switch to turn the boarding lights and cockpit courtesy lights on, and push the bottom to turn them off. The boarding lights are located on the outboard side of the radar arch. The courtesy lights are located at the port and starboard sides of the cockpit area. The lights are protected by a resettable circuit breaker located on the dash circuit breaker panel.

NAVIGATION LIGHTS SWITCH

Push the top half of the switch to operate the navigation lights. The navigation lights are the port and starboard side lights, front half of the mast light and stern light. The lights are protected by a resettable circuit breaker located on the circuit breaker panel.

PANEL LIGHTS SWITCH

Push the top of the rocker switch to illuminate the gauges and compass. The panel lights are protected by a resettable circuit breaker located on the dash circuit breaker panel.

TRIM TAB CONTROLS

IMPORTANT

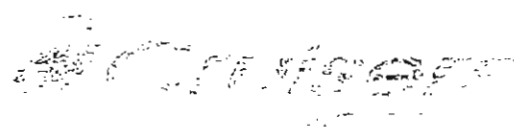
Push the trim tab rocker switches in half second bursts. Holding the rockers down too long will overtrim the boat.

The trim tab rocker switches are used to correct the trim of your boat while you are underway. To trim the bow of your boat up, push the bottom halves of both switches. To trim the bow of your boat down, push the top halves of both switches. Refer to Suggested Operating Techniques in Section 5 for detailed information. The trim tabs are protected by a resettable circuit breaker located on the dash circuit breaker panel.

HALON FIRE EXTINGUISHER DISPLAY UNIT

The display unit has an indicator lamp or lamps (depending on unit type) to indicate Halon automatic fire extinguisher status.

See Halon Owner's Manual in the skipper's kit for complete operating details.



SHIFT/THROTTLE CONTROLS

The port and starboard engines each have their own shift/throttle control lever. Each shift control lever has three positions: forward, neutral and reverse. Push the levers away from you to go forward, and pull the levers towards you to go in reverse. Full throttle is achieved by pushing the lever all the way forward. The detent position between forward and reverse is neutral.

NEUTRAL THROTTLE WARM-UP (Stern Drives Only)

To increase engine idling RPM for the purpose of "warming up a cold engine," grab the shift/throttle control lever, while in Neutral, and pull it out from the base. Move the lever forward or rearward to increase RPM.

STEERING WHEEL

The steering wheel is mechanically linked to the out drive.

WIPERS SWITCH

Push the top half of the switch to turn the wipers on. The wiper circuits are electrically protected by a resettable circuit breaker, located on the dash circuit breaker panel.

AFT BILGE PUMP SWITCH

Bilge pump operation is automatic, but can be controlled manually. To start the engine compartment bilge pump, push the top half of this switch; push the bottom half of the switch to turn this bilge pump off. Aft bilge pump, located in the engine compartment, is electrically protected by the resettable circuit breaker located on the dash circuit breaker panel.

FORWARD BILGE PUMP SWITCH

Bilge pump operation is automatic, but can be controlled manually. To start the bilge pump, push the top half of the switch; push the bottom half of the switch to turn it off. Aft bilge pump, located in the cabin under the carpeted floor hatch, is electrically protected by the resettable circuit breaker located on the circuit breaker panel.

SHOWER SUMP PUMP

The sump pump is used to discharge the shower water overboard. The sump pump is located in a plastic tray under the carpeted floor hatch in the cabin. The power for the pump is controlled by the head compartment breaker.

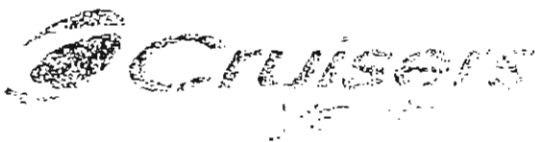
BLOWERS SWITCH



WARNING

Gasoline vapors can explode! Always check the engine compartment for the presence of gasoline odor. Operate blower for at least four minutes before cranking engine. Run blowers when operating engine below cruising speed.

Push the switch on the top half to turn the blower on, and on the bottom to turn the blower off. Blower circuits protection is provided by a resettable circuit breaker located on the dash circuit breaker panel.



SPOTLIGHT CONTROLS

The switch in the middle is a three position toggle switch. It controls the light mounted to the pulpit railing. Move the switch up for spotlight effect, to the middle for "off", and down for the spotlight effect. The joystick to the left controls the movement of the light, and the knob to right controls the speed at which the light will move. The spotlight is electrically protected by a resettable circuit breaker located on the dash circuit breaker panel.

IGNITION SWITCHES

The port and starboard engines each have their own ignition switch.

The ignition switch is a three position: off/stop, run, and start. There is no accessory position.

The switch is electrically protected by a resettable circuit breaker located on the DC panel in the main cabin.

ACCESSORY SWITCHES

These switches control any accessory electrical items.

ANCHOR CONTROL

Push the top of the switch to weigh (pull in) anchor; push the bottom of the switch to lower the anchor. The anchor control is protected by a resettable circuit breaker located on the dash circuit breaker panel.

ANCHOR LIGHT SWITCH

Push the top half of the switch to activate the anchor light; push the bottom half to turn the anchor light off. The anchor light is located atop the radar arch and shines white in 360°. The anchor light is protected by a resettable circuit breaker located on the dash circuit breaker panel.

DASH CIRCUIT BREAKER PANEL

NAV. LIGHTS. The navigation lights are protected by this resettable circuit breaker.

WIPER. The windshield wipers circuit is protected by this circuit breaker.

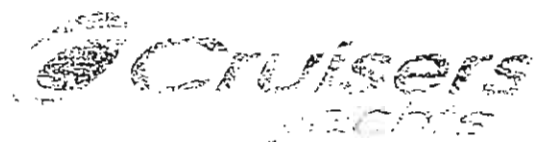
BLOWER. The bilge blowers are protected against surges and overload by this circuit breaker.

HORN. This circuit breaker protects the electric horn.

TRIM TABS. The trim tab system is protected by this circuit breaker.

SPOTLIGHT. The remote control spotlight, mounted on the pulpit railing, is protected by this circuit breaker.

ACC. Any accessory electrical systems are protected by these resettable circuit breakers.



AFT BILGE PUMP. The manual operation of the aft bilge pump is protected by this circuit breaker. The automatic operation of the aft bilge pump is protected by a circuit breaker on the DC Master Panel.

FORWARD BILGE PUMP. The manual operation of the bilge pump is protected by this circuit breaker. The automatic operation of the forward bilge pump is protected by a circuit breaker on the DC Master Panel.

BOARD LIGHTS. This circuit breaker protects the boarding lights and cockpit courtesy lights.

ANCHOR. The anchor system is protected by this resettable circuit breaker.

UNIT TILT/TRIM CONTROLS

The unit tilt/trim controls are used to tilt the engine out drives. Refer to your engine owner's manual for details.

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Section 4 – Principles of Operation

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ENGINE POWER SYSTEM/STERN DRIVE INSTALLATION

The power generated by the engine is transmitted to the propeller via the outdrive.

Engines

Your boat is powered by dual inboard/outboard (I/O) engines. All the operation, specification and maintenance information is contained in the engine owner's manual. Find this manual, which is located in the skipper's kit, and familiarize yourself with it. The engines are the heart of your boat, and following the manufacturer's recommendations will provide you with continued boating pleasure.

COOLING SYSTEM



CAUTION

Make sure the lower outdrive is in the water before starting the engine. Operating the boat engine for a very short period of time, without cooling water, can result in permanent engine damage.

Your boat engine, unless it has a freshwater cooling system, is cooled by seawater entering the outdrive. Water, from the outdrive, is circulated through the engine water jacket and returned to the sea through the exhaust system. Water discharged with the exhaust cools engine exhaust gas as it is being discharged. The temperature gauge on the dash panel will tell you if the engine is overheating.



CAUTION

(For engines with freshwater cooling system) The cooling system starts at the cooling water seacock, which can be shut off for a number of reasons. Make sure the seacock is open before starting the engine. The absence of cooling water will cause the engine to overheat, and cause irreparable damage.

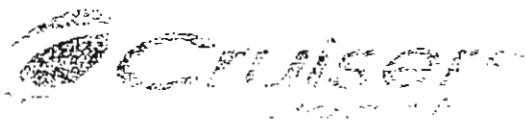
Engines, with a freshwater cooling system, use incoming seawater to cool a secondary closed cooling system. Seawater flows through an engine mounted heat exchanger, cools the closed system coolant and is returned to the sea via the exhaust system.

AUDIBLE ALARM SYSTEM

The engine installed in your boat may have an audible alarm system. If this is the case, the alarm will sound under the following conditions:

- Engine temperature exceeds specified limits
- Engine oil pressure drops below specified limits
- Ignition switch is "on," engine is "off"

To test the alarm system, turn the ignition switch to the "on" position. Depending upon the engine, the alarm may sound immediately, or after a few seconds delay.



Propellers

The propellers installed on your boat were selected because their diameter and pitch provide the optimum speed and performance under average conditions of load. Propeller selection must be based upon the ability of the engine to turn the propeller and achieve the manufacturer's recommended RPM at full throttle.

NOTE

Variations from average loadings, bottom condition and/or engine condition could call for a propeller change to achieve the performance desired. The propellers furnished by the factory are replaceable at cost.

SELECTING A PROPELLER



CAUTION

Improper propeller selection and installation could result in loss of the propeller, and/or excessive stresses on the engine power system leading to engine failure. Cruisers recommends that you consult with and employ the skills of your dealer when contemplating a change.

First, ensure that the diameter and pitch provide the performance desired. The engine RPM at full throttle should be in the upper half of the recommended full throttle operating range. If RPM's are low, a propeller with a smaller pitch will increase RPM's. If RPM's are high, a propeller with an increased pitch will lower RPM's.

Second, ensure that the propeller rotation is consistent with engine and lower outdrive rotation.

FUEL SYSTEM

Your boat is equipped with an internal fuel system meeting current federal requirements. The best materials and components available are used to assemble the fuel system.

Model 2870 boats have an aluminum, 110 gallon fuel tank that is located under the midship floor. The fuel tank can be accessed through the amidship cabin. The tank outlet to the engine has an anti-siphon valve for fuel shut-off in the event of a line break.

The fuel fill cap is located on the starboard side of the cockpit. Near the fill cap is a vent which allows air to move in and out of the tank as the fuel level changes.



WARNING

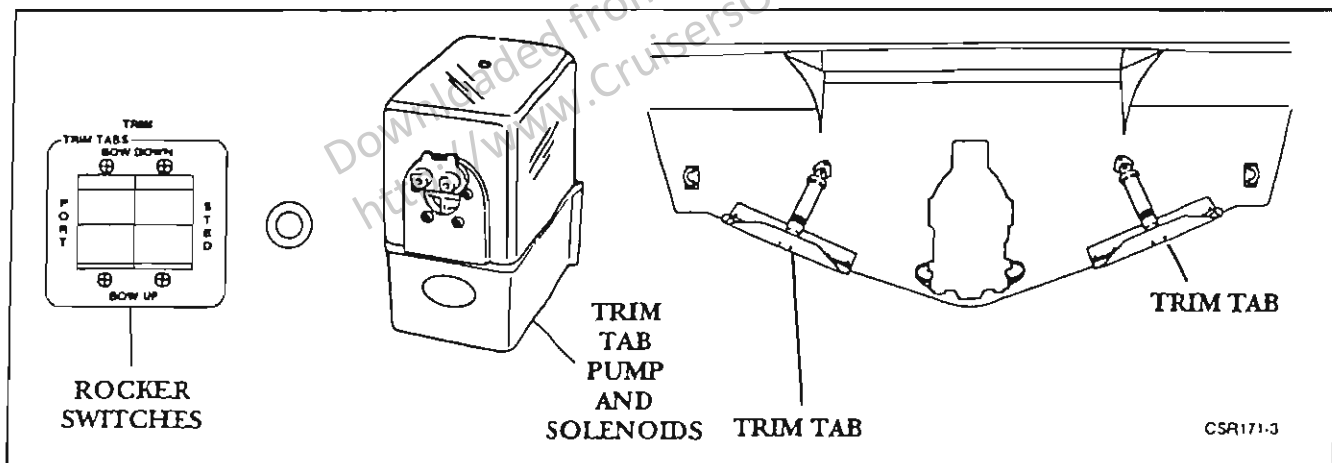
Leaking fuel and fumes are a fire and explosion hazard. Inspect the entire fuel system regularly.

All fuel system components must be checked before each boating season and regularly during the season for any leaks or bad hose conditions. Make sure the fuel system is leak free.

STEERING SYSTEM

Refer to the engine manufacturer's information package, in the skipper's kit, for a description of the steering system installed in your boat.

TRIM TABS



The trim tab system is an electro-hydraulic system. Two rocker switches, marked port and starboard, control a hydraulic pump and solenoids. The pump sends hydraulic oil to hydraulic actuators (cylinders) which lower the trim tabs. To raise the trim tabs, the rocker switch is moved which allows oil to flow from the actuator to the pump.

ELECTRICAL SYSTEM

Your boat is equipped with two electrical systems; a battery powered direct current (DC) system, and a generator or shore powered alternating current (AC) system. Each system has a master panel.

The DC system supplies electricity to all of the boat's electrical circuits (lights, pumps, blowers, ignition, etc.).

The AC system supplies power to the port and starboard electrical outlets, and to 120 volt systems (electric stove, water heater, microwave, refrigerator and battery charger) when the boat is moored at the dock.

DC Electrical System



WARNING

Considerable care has been taken to design a safe electrical system to protect you from hazardous shocks. Any modifications to the system should always be done by an authorized Cruisers dealer not only to protect your warranty, but to protect you from hazardous shock.

Your boat has a 12 volt negative ground DC system. The positive wire is hot, and feeds current from the batteries to the various 12 volt systems, and the negative wire is the ground.

Your boat is equipped with three batteries. Two batteries (cranking batteries) are used only to start the engines. The third battery is an auxiliary battery which provides power to all of the other DC electrical circuits via the master battery switch.

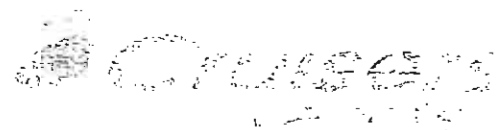
When the engines are running, all batteries are charged by the two engine alternators and the rate of charge is controlled by voltage regulators.

The electrical system is grounded by grounding the cranking batteries to the engines, and the auxiliary battery to the cranking batteries. The engines are connected by ground cable to provide added assurance that a good ground is being achieved. The engines are then grounded to a bonding strip located in the engine compartment.

The auxiliary battery is separated from the cranking batteries by an electronic solid state isolator. When the engines and ignition switches are "off", the isolator prevents accessory loads from depleting the cranking batteries. When the batteries are being charged by the alternators, the isolator automatically combines and isolates the alternator output and distributes the charge among the batteries according to individual need.

DC MASTER PANEL

The DC master panel consists of a voltmeter, a series of switch type and resettable circuit breakers, and the master breaker switch.



The *meter* is a convenience feature which allows you to check on the condition of the three batteries. With master breaker switch in the "OFF," position, turn battery test switch to:

- "1" to check the starboard engine cranking battery,
- "2" to check the port engine cranking battery,
- "3" to check the auxiliary battery, and
- "OFF" to disable meter and test circuit.



CAUTION

Never reset a breaker which has been automatically tripped without first discovering and remedying the cause of the problem.

The switch type circuit breakers' function is twofold: they allow you to manually enable or interrupt a circuit by moving the switch on or off, and they protect the system receiving the DC current (power) by automatically opening the circuit should a short or overload condition occur.

The resettable circuit breakers protect the system receiving the DC power by automatically opening the circuit should a short or overload occur.

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OPERATION OF DC SYSTEMS

Read through the table below to familiarize yourself with the DC systems on your boat.

DC Circuit Breaker	Function
MASTER BREAKER	This is the master switch for the DC systems. Put the switch in the "on" position to send current to all DC circuit breakers. When this switch is "off", the flow of current is interrupted to all DC systems with the exception of the automatic bilge pumps.
AUTO BILGE PUMP BREAKER	As a safety feature, the automatic bilge pumps are wired to bypass the MASTER so that they will function when the master is shut off. The circuits for the forward and aft bilge pumps are each protected by a resettable circuit breaker.
HEAD	Flip the switch to the "On" position to send current to the head compartment switch panel for the lights, head ventilation system, and macerator pump. Also it provides power to the sump pump, electric toilet and the waste tank indicator.
FRESHWATER PUMP	Flip the switch to the "on" position to send current to the fresh water pump. The pump maintains pressure in the freshwater system. Move the switch to the "off" position to interrupt the flow of current to the pump.
REFRIGERATOR	Flip the switch to the "on" position to send current to the refrigerator. Move the switch to the "off" position to interrupt the flow of current.
CABIN LIGHTS	Flip the switch to the "on" position to send current to the light switches in the cabin. Move this switch to the "off" position to interrupt the flow of current.
BILGE LIGHTS	Flip the switch to the "on" position to turn the lights on in the bilge. Move this switch to the "off" position to turn the lights off.
COCKPIT LIGHTS	Flip the switch to the "on" position to turn the lights on in the cockpit area. Move this switch to the "off" position to turn the lights off.
ACC	These circuit breakers handle any accessory DC system.
CARBON MONOXIDE DETECTOR	This circuit breaker protects the carbon monoxide detector circuit against shorts or overload.

AC Electrical System



WARNING

Considerable care has been taken to design a safe electrical system to protect you from hazardous shocks. Any modifications to the system should always be done by an authorized Cruisers dealer not only to protect your warranty, but to protect you from hazardous shock.

Your AC systems are rated for 125 volts at 60 cycles. Source current can be provided from a 110 volt, 60 cycle shore power station, or from the onboard generator. The AC system in your boat is much like the system in your home. The hot wire (usually black) sends current to the AC system. The neutral wire (always white) sends current back to the source, and the ground wire (always green) grounds all systems to a common ground. In your boat the common ground is the copper bonding strip located in the engine compartment.

AC MASTER PANEL

The AC master panel consists of a voltmeter, a power transfer slide protector, and generator controls.

The meter is an important feature, because they allow you to monitor the AC voltage. Damage to components can occur if voltage entering your system is less than 105 volts. Do not use any of your AC systems if you get a reading of 105 volts or less.



CAUTION

Never reset a breaker which has been automatically tripped, without first discovering and remedying the cause of the problem.

The circuit breakers' function is twofold; they allow you to manually enable or interrupt a circuit by flipping the switch on or off, and they also protect the system receiving the AC load by automatically breaking the circuit in cases of shorts or overloads.

IMPORTANT

Read the generator owner's manual contained in the skipper's kit before operating the generator for the first time. The manual contains important operation and maintenance information.

The generator controls turn the generator on and off. The BLOWERS switch operates the bilge blowers. Flip the switch up to operate the bilge blowers. Before attempting to start the generator, the bilge area must be purged of all fumes. Operate the blowers for at least 4 minutes.

The STOP switch interrupts current to the generator. Turn the START switch on to start the generator. Release the START switch when the GENERATOR RUNNING indicator lights.

The ON/PREHEAT switch is used only on diesel generators.

OPERATION OF AC SYSTEMS

Read through the table below to familiarize yourself with the AC systems on your boat.

AC Switch	Function
-----------	----------

DOCKSIDE 1



CAUTION

Do not turn on the breaker for shore power if the reverse polarity indicator lights up. Disconnect the cable and have the fault corrected by a qualified electrician.

When you are running dockside power to the dockside 1 power hookup, move the slide protector over the GENERATOR breaker on the AC Power Control panel. Flip the DOCKSIDE 1 breaker to the "on" position to send current to the AC POWER NO. 1 and AC POWER NO. 2 panels. When this switch is in the "off" position, the flow of current to the panels is interrupted. When dockside 1 current is present, the DOCKSIDE 1 POWER indicator will illuminate.



WARNING

Some marinas have been known to "break" shore power ground circuits to prevent electrolysis. Opening the ground circuit creates a potentially dangerous on-board shock hazard. Ensure that your shore power cable ground circuit is always continuous.

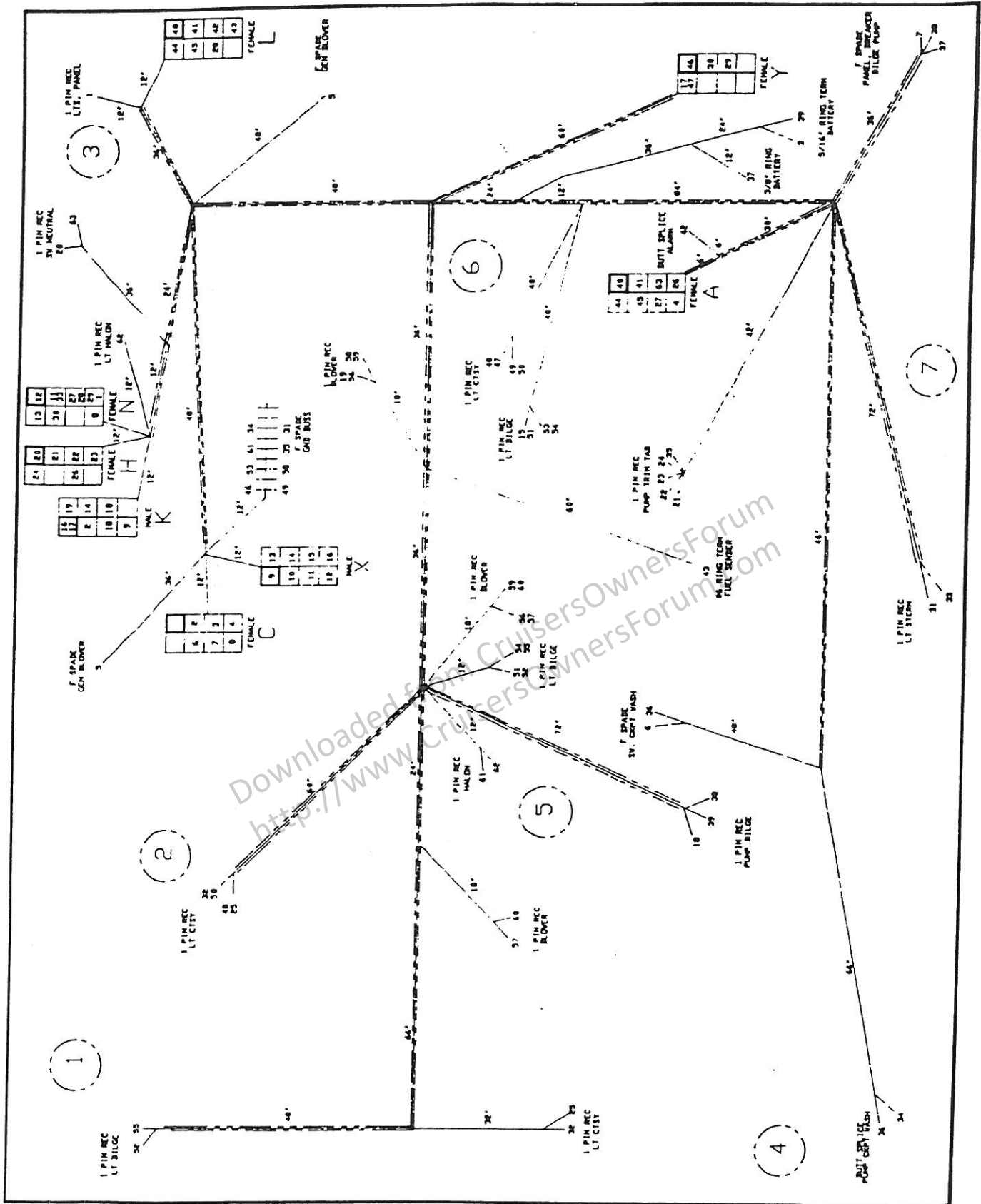
Connecting Shore power cable:

1. Make sure the breaker for load group being connected is in the "off" position.
2. Connect shore power cable at the boat receptacle and then at the shore receptacle.
3. When disconnecting shore power cable turn the breaker for load group being disconnected to the "off" position.
4. Disconnect shore power cable from the shore receptacle, and then from the boat receptacle.

AC Switch	Function
GENERATOR	<p>When you are going to run AC POWER NO. 1 systems off the generator, move the slide protector located on the AC POWER NO. 1 systems off the generator, move the slide protector located on the AC power control panel to lock the DOCKSIDE 1 breaker in the "off" position. Start the generator and flip the GENERATOR breaker to the "on" position. Current is now being sent to the AC POWER NO. 1 panel.</p> <p>Read the generator owner's manual before operating the generator.</p>
DOCKSIDE 2	<p>When you are running dockside power to the dockside 2 power hookup, move the slide protector over the GENERATOR breaker on the AC POWER NO. 2 panel. Flip the DOCKSIDE 2 breaker to the "on" position to send current to the AC POWER NO. 2 panel. When this switch is in the "off" position, the flow of current to the AC POWER NO. 2 panel is interrupted. When dockside 2 current is present, the DOCKSIDE 2 POWER indicator will illuminate.</p>
GENERATOR	<p>When you want to run the AC Power No. 2 panel off the generator, move the protective slide over the DOCKSIDE 2 breakers. Start the generator and then flip the GENERATOR breaker on the AC Power No. 2 panel to the "on" position. Current is now being sent to the AC Power No. 2 panel.</p>
AC POWER NO. 1	<p>This is the master switch for the AC Power No. 1 panel. Put the switch in the "on" position to send current to all circuit breakers on this panel. When this switch is "off", the flow of current is interrupted to all circuit breakers on the panel. The POWER AVAILABLE indicator will illuminate when current is supplied to the AC POWER NO. 1 master switch.</p>
STOVE	<p>Flip this switch to the "on" position to send current to the stove. Move the switch to the "off" position to interrupt the flow of current. Refer to the owner's manual for operating instructions.</p>
MICROWAVE	<p>Flip this switch to the "on" position to send current to the microwave. Move the switch to the "off" position to interrupt the flow of current. Refer to the owner's manual for operating instructions.</p>
BATT CHGR	<p>Flip the switch to the "on" position to turn the battery charger on. The battery charger provides for automatic battery charging. It converts shore power or generator AC power to 12 volts DC and distributes the charge automatically to all the batteries according to need. Move the switch to the "off" position to turn the charger off.</p>
WATER HEATER	<p>Flip the switch to the "on" position to turn the water heater on. The water heater is controlled by thermostat to keep the water at a constant temperature. Move the switch to the "off" position to turn the water heater off. Never turn on the water heater without water in the heater to avoid damaging the heating element.</p>

AC Switch	Function
OUTLETS	<p>Flip this switch to the "on" position to send current to the outlets on the boat. Move the switch to the "off" position to interrupt the current.</p> <p><i>GROUND FAULT CIRCUIT INTERRUPTER (GFCI)</i></p> <p><i>The starboard and port outlets are monitored by GFCI outlets.</i></p> <p><i>These GFCI outlets provide protection against ground fault currents which can cause shocks that may be fatal. A ground fault current is caused by an AC system with faulty insulation. When a person uses the defective AC system, and if that person is contacting an electrical ground, then stray current caused by faulty insulation will flow through the person's body.</i></p> <p><i>When a ground fault is detected in an AC system, the GFCI outlet will "trip" and interrupt the flow of current.</i></p> <p><i>Test GFCI outlets regularly. Push the test button and all current to the outlets on that line should be interrupted. If the power is not interrupted, do not use the outlets, and have a qualified technician make the necessary repairs. Press the reset button to restore power to all the outlets.</i></p>
REFRIGERATOR	<p>Flip this switch to the "on" position to send current to refrigerator. Move the switch to the "off" position to interrupt the flow of current. Refer to the owner's manual for operating instructions.</p>
SPARE	<p>These circuit breakers were installed to handle any additional AC system that you may want to add to the existing systems.</p>
AIR CONDITIONER	<p>Flip this switch to the "on" position to send current to the air conditioner control panel located in the master stateroom. Move the switch to the "off" position to interrupt the flow of current. Refer to the owner's manual for detailed operating instructions.</p> <p>When operating the air conditioner, the head switch breaker on the DC Panel also needs to be in the on position. This will supply power to the shower sump pump which pumps out the air conditioner condensation.</p>

AC SCHEMATIC



Harness, Engine Compartment

PARTS LIST			
WIRE NO.	FROM	TO	CONDUCTOR DESCRIPTION
1	N4	3	LT PANEL
2	C2	K2	HORN
3	C3	7	GND BP FWD
4	C4	A8	BATT PORT
5	2	3	BLOWER, GEN
6	C6	5	SW CKPT WASH
7	C7	7	BP AUTO FWD
8	C8	N8	SW IGN BATT P
9	X1	K4	WIPER
10	X2	K7	WIPER PARK
11	X3	N2	LT NAV
12	X4	N1	WINDLASS UP
13	X5	N5	WINDLASS DWN
14	X6	K6	BP FWD
15	X7	6	LT BILGE
16	X8	K1	LT CTSY
17	K1	Y5	LT CTSY
18	K3	5	BP AFT
19	K5	6	BLOWERS
20	H1	3	START PORT
21	H2	7	PUMP, TRIMTAB
22	H3	7	PUMP, TRIMTAB
23	H4	7	PUMP, TRIMTAB
24	H5	7	PUMP, TRIMTAB
25	2	4	LT CTSY
26	H7	A4	GAUGE TRIM PORT
27	N3	A7	IGN, PORT
28	N3	L7	IGN, PORT
29	N4	Y3	LT, MAST
30	N6	Y2	LT, ANCHOR
31	6	7	GND LT STERN
32	2	4	GND LT CTSY

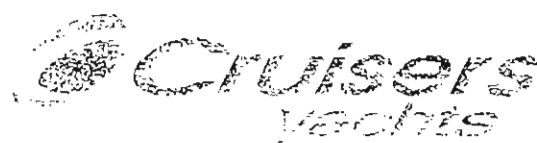
PARTS LIST			
WIRE NO.	FROM	TO	CONDUCTOR DESCRIPTION
33	N2	7	LT STERN
34	6	4	GND PUMP WASH
35	6	7	GND PMP TT
36	5	4	PUMP CKPT WASH
37	7	7	12V+ AUTO BP
38	5	7	AUTO BP AFT
39	5	7	GND BP AFT
40	L1	A1	GND INST PORT
41	L2	A2	TACH PORT
42	L3	7	ALARM PORT
43	L4	5	SNDR FUEL PORT
44	L5	A5	TEMP PORT
45	L6	A6	OIL PORT
46	Y1	6	GND LT MAST
47	Y5	6	LT CTSY
48	6	2	LT CTSY
49	6	6	GND LT CTSY
50	6	2	GND LT CTSY
51	6	5	LT, BILGE
52	5	1	LT, BILGE
53	6	6	GND LT BILGE
54	6	5	GND LT BILGE
55	5	1	GND LT BILGE
56	6	5	BLOWERS
57	5	5	BLOWERS
58	6	6	GND BLOWER
59	6	5	GND BLOWER
60	5	5	GND BLOWER
61	6	5	GND HALON
62	3	5	LT HALON
63	3	A3	START PORT



Harness, Engine Compartment Twin

PARTS LIST			
WIRE NO.	FROM	TO	CONDUCTOR DESCRIPTION
1	N4	3	LT PANEL
2	C2	K2	HORN
3	C3	7	GND BP FWD
4	C4	A8	BATT PORT
5	2	3	BLOWER, GEN
6	C6	5	SW CKPT WASH
7	C7	7	BP AUTO FWD
8	C8	N8	SW IGN BATT P
9	X1	K4	WIPER
10	X2	K7	WIPER PARK
11	X3	N2	LT NAV
12	X4	N1	WINDLASS UP
13	X5	N5	WINDLASS DWN
14	X6	K6	BP FWD
15	X7	6	LT BILGE
16	X8	K1	LT CTSY
17	K1	Y5	LT CTSY
18	K3	5	BP AFT
19	K5	6	BLOWERS
20	H1	3	START PORT
21	H2	7	PUMP, TRIMTAB
22	H3	7	PUMP, TRIMTAB
23	H4	7	PUMP, TRIMTAB
24	H5	7	PUMP, TRIMTAB
25	2	4	LT CTSY
26	H7	A4	GAUGE TRIM PORT
27	N3	A7	IGN, PORT
28	N3	L7	IGN, PORT
29	N4	Y3	LT, MAST
30	N6	Y2	LT, ANCHOR
31	6	7	GND LT STERN
32	2	4	BND LT CTSY
33	N2	7	LT STERN
34	6	4	GND PUMP WASH
35	6	7	GND PUMP TT
36	5	4	PUMP CKPT WASH
37	7	7	12V+ AUTO BP
38	5	7	AUTO BP AFT

PARTS LIST			
WIRE NO.	FROM	TO	CONDUCTOR DESCRIPTION
39	5	7	GND BP AFT
40	L1	A1	GND INST PORT
41	L2	A2	TACH PORT
42	L3	7	ALARM PORT
43	L4	5	SNDR FUEL PORT
44	L5	A5	TEMP PORT
45	L6	A6	OIL PORT
46	Y1	6	GND LT MAST
47	Y5	6	LT CTSY
48	6	2	LT CTSY
49	6	6	GND LT CTSY
50	6	2	GND LT CTSY
51	6	5	LT, BILGE
52	5	1	LT, BILGE
53	6	6	GND LT BILGE
54	6	5	GND LT BILGE
55	5	1	GND LT BILGE
56	6	5	BLOWERS
57	5	5	BLOWERS
58	6	6	GND BLOWER
59	6	5	GND BLOWER
60	5	5	GND BLOWER
61	6	5	GND HALON
62	3	5	LT HALON
63	3	A3	START PORT
64	M1	B1	GND INST STBD
65	M2	B2	TACH STBD
66	3	B3	START STBD
67	H8	B4	GAUGE TRIM STBD
68	M5	B5	TEMP STBD
69	M6	B6	OIL STBD
70	N7	B7	IGN STBD
71	C1	B8	BATT STBD
72	6	M3	ALARM STBD
73	N7	M7	IGN STBD
74	C5	K8	BATT STBD
75	H6	3	START STBD



The diagram illustrates the hull layout of a ship, divided into seven numbered sections (1-7). Each section contains detailed drawings of various compartments and equipment, with labels indicating their function and location. Key components include:

- Section 1:** Includes '1 PIN REC LT ON GALLEY', 'F SPARE', 'BUTT SPICE', and 'NO TERM'.
- Section 2:** Includes '1 PIN REC LT BULLET', 'F SPARE', 'BUTT SPICE', and 'NO TERM'.
- Section 3:** Includes 'F SPARE', 'BUTT SPICE', and 'NO TERM'.
- Section 4:** Includes '1 PIN REC PUMP SHOWER', '1 PIN REC PUMP F.V.', and '1 PIN REC PUMP BUCKET'.
- Section 5:** Includes 'F SPARE', 'BUTT SPICE', and 'NO TERM'.
- Section 6:** Includes 'F SPARE', 'BUTT SPICE', and 'NO TERM'.
- Section 7:** Includes 'F SPARE', 'BUTT SPICE', and 'NO TERM'.

Several small tables are included, likely representing inventory or specifications for the equipment shown:

- Table 1 (Top Left):**

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Harness, Liner

PARTS LIST			
WIRE NO.	FROM	TO	CONDUCTOR DESCRIPTION
1	1	N3	ANT. T.V.
2	1	5	GND. ANT.
3	4	7	LT GALLEY
4	1	7	GND LT GALLEY
5	1	N7	REFRIGERATOR
6	1	5	GND REF.
7	5	1	LT HD OH
8	1	5	GND LT HD
9	5	4	PUMP HD
10	5	N1	SW PMP HD
11	4	N4	SW LT OH
12	4	5	LT OH
13	5	5	GND LT OH
14	K1	5	GND STEREO
15	K2	6	CLOCK
16	K3	3	SPKR L CABIN
17	K4	5	SPKR R CABIN
18	K5	N2	12V+ STEREO
19	K7	3	SPKR L CABIN
20	K8	5	SPKR R CABIN
21	S1	2	SPKR L FSR
22	S2	5	SPKR L CKPT
23	S3	7	SPKR R CKPT
24	S4	3	SPKR-R FSR
25	S5	2	SPKR L FSR
26	S6	5	SPKR L CKPT
27	S7	7	SPKR R CKPT
28	S8	3	SPKR R FSR
29	4	5	GND PMP HD
30	5	5	GND SNDR HD
31	5	5	HD TANK FULL
32	5	5	HD TNK EMPTY
33	5	5	HD TANK MID
34	5	5	MACERATOR
35	5	5	GND MACERATOR
36	4	M5	PUMP, F.W.
37	4	5	GND PUMP FW
38	7	7	LT BULLET
39	7	7	GND LT BULLET
40	7	N8	LT BULLET
41	7	5	GND LT BULLET
42	5	N6	CO DETECTOR
43	5	5	GND CO

PARTS LIST			
WIRE NO.	FROM	TO	CONDUCTOR DESCRIPTION
44	X1	5	WIPER
45	X2	5	WIPER PARK
46	5	5	GND WIPER
47	X3	3	LT NAV
48	5	3	GND LT NAV
49	X4	3	WINDLASS UP
50	X5	3	WINDLASS DWN
51	X6	4	PUMP BILGE FWD
52	X7	M3	LT BILGE
53	N8	3	LT BULLET
54	5	3	GND LT BULLET
55	3	2	LT BULLET
56	3	2	GND LT BULLET
57	N3	5	12V+ BREAKER
58	5	5	12+ IND
59	5	5	GND, IND
60	C2	3	HORN
61	5	3	GND HORN
62	3	2	HORN
63	3	2	GND HORN
64	C1	M7	BATT STBD
65	C4	M6	BATT PORT
66	C5	M8	BATT STBD
67	C8	M4	BATT PORT
68	C6	M2	PUMP W.D.
69	C7	4	BP AUTO FWD
70	C3	4	GND BP FWD
71	N6	3	CO DETECTOR
72	3	5	GND CO
73	4	5	PMP SHOWER SMP
74	4	5	GND PUMP
75	N5	5	GND DC PANEL
76	M1	X8	LTS CKPT
77	N4	5	SW LT HD
78	3	2	LT NAV
79	3	2	GND LT NAV
80	1	1	LT OH
81	1	1	GND LT OH
82	1	1	LT OH
83	1	1	GND LT OH
84	4	2	LT OH GALLEY
85	5	2	GND LT OH

A Word About Electrolysis

Electrolysis is the decomposition of compounds, such as metals, exposed to an electric current. For boat owners, electrolysis is a common occurrence. Using a shore power AC electrical system on the boat includes an earth ground circuit that "grounds" all onboard metal parts to the earth on shore. This circuit provides the protection against hazardous shocks, but unfortunately it also creates an electrolytic current which causes the decomposition of all submerged metal.

SOLUTIONS TO ELECTROLYSIS

IMPORTANT

Damage resulting from electrolytic corrosion is not covered by the warranty.

Additional zinc anodes may need to be installed on your boat as recommended for your region.

A *zinc anode* is also used to protect metal that is exposed to seawater. The salt in seawater causes a galvanic action which decomposes metals. The dockside wiring receptacle has a zinc anode. Check it periodically and have it replaced if necessary by your Cruiser Dealer.

A *Ground Circuit Isolator* can be installed to prevent the flow of relatively low electrolytic currents. It will, however, provide a path for catastrophic, short-circuit currents which are sufficient to actuate circuit breakers.

A *5000-6000 volt amperes Isolation Transformer* can be installed between the on-board AC electrical system and the shore power source.

A Word About Bonding

Engines installed in non-metallic hulls do not provide shielding or adequate grounding. Cruisers uses a copper bonding strip in the engine compartment to solve this problem. All metal parts of your boat are bonded to this common ground. The AC and DC ground wires also meet at the bonding strip.

Bonding helps minimize electrolysis, it provides a common ground for radio interference signals, and it minimizes radio frequency interference (RFI) from the boat by connecting the metal parts to form a shield.

FRESHWATER SYSTEM

The freshwater system provides water for drinking and bathing. A tank provides an onboard supply of freshwater, and a connection for optional dockside hookup allows you to use a continuous supply of city water. The plumbing provides freshwater to the head compartment, to the cockpit shower, and to the sink in the galley. All freshwater drainage is directed overboard.



Freshwater Tank

The boat is fitted with a 30 gallon freshwater tank. It is filled through the fill plate located on the starboard side of the deck. The tank is vented through the hull, this allows air to enter/escape as water levels rise and fall.

IMPORTANT

Fill the tank only with potable water. Using and refilling the tank often will help keep it a source of clean drinking water.

FILTER AND PUMP

Water is drawn from the tank by a self-priming pump located under the starboard midship cushion. Before entering the pump, the water passes through a filter to capture any contaminants. The pump provides a flow of water at a preset pressure to the remainder of the system. Should the system develop a leak or become empty, a dry tank shut down switch prevents pump burnout.

INITIAL STARTUP

Step 1 - Fill the freshwater tank with approximately 10 gallons of potable water.

Step 2 - Turn the FRESHWATER PUMP breaker on.

Step 3 - Open the cold water galley faucet to allow air to escape. Close the faucet when a steady flow of water is apparent.

Step 4 - Open the hot water galley faucet to fill the water heater and allow air to escape from the line. Close the faucet when a steady flow of water is apparent.

Step 5 - Bleed air from the remainder of the faucets in the same manner as steps 3 and 4. After all lines have been bled, the pump will build to operating pressure and then shut off.

Step 6 - You may now continue to fill the tank to its capacity of 30 gallons.

City Water Hookup



CAUTION

Monitor the water system during initial usage of the "city water" feature. In this mode, the boat is connected to an unlimited source of water. NEVER leave boat unattended while using the "city water" feature. Any major leak or break in the system will allow abnormal bilge accumulation which in turn could cause sinking or swamping of batteries and engine. Damage from swamping and/or submergence are not covered by warranty.

As an alternative to your freshwater tank, the freshwater system can be connected to "city water" at the receptacle on the starboard stern of the boat. Because the water enters the boat under pressure, it bypasses the tank, the filter, the pump, and the pressure accumulator.

NOTE

Using "city water" hookup does not replenish water supply in the tank. The tank can only be filled at the freshwater fill plate.

When using a dockside hookup, you will have to bleed all the lines as you did in initial start-up for the freshwater tank system.

Hot Water Heater

The hot water tank is equipped with a high pressure relief valve for safety, and a thermostat that regulates the heater to a specific water temperature. The thermostat is adjustable to suit individual taste. The electric hot water heater is operated by turning on the WATER HEATER breaker switch located on the AC Power No. 1 panel. The electric hot water heater provides fast recovery, and is capable of reheating a tank quite rapidly.



CAUTION

Do not turn the hot water switch on unless the freshwater system is charged. Damage to the heating element will result if allowed to heat up with no water in the system.

The hot water tank also operates via a heat exchanger. Heated cooling water from the engines is delivered to a heat exchanger which in turn heats the water in the hot water tank. After the cooling water circulates through the exchanger, it is returned to the engine exhaust system which dumps it overboard.

HEAD AND WASTE CONTAMINANT SYSTEM

The head on your boat has either the 20 gallon manually operated system or optional electric head which draws seawater in through the hull to flush waste water from the marine toilet. The toilet pumps the waste water on to a 20 gallon holding tank.

Waste Holding Tank for 20 Gallon System

The waste holding tank is located to the port side of the midship cushions. Waste is pumped from the head through a sanitary waste hose to the top portion of the tank. A 1-1/2" sanitary waste hose is attached to the bottom of the tank, and runs to the dockside pumpout plate on the starboard stern of the boat. An overboard vent keeps the tank at atmospheric pressure regardless of waste levels.

All the components which comprise the waste system are made of materials specially formulated to prevent odor permeation and to resist chemical actions. It is strongly recommended that you regularly add chemical to your tank by flushing it through the head. The chemical helps to control odor and break down the waste. Follow the manufacturer's instructions on the chemical before using.



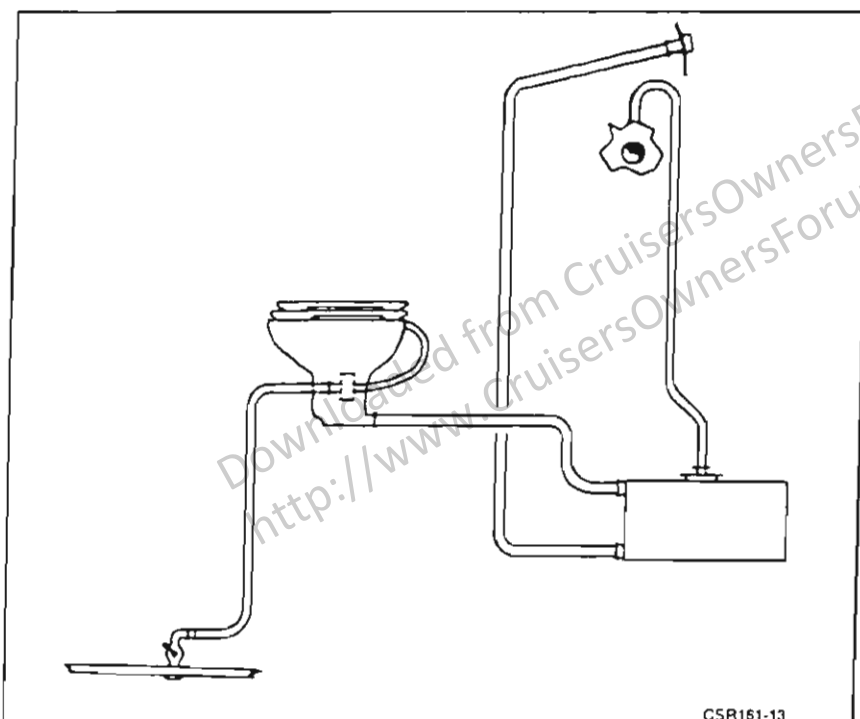
CAUTION

Do not flush into a full holding tank. Attempting to flush the head when the tank is full could result in damage to the waste system.

A waste tank indicator is also installed to provide a visual indication of the amount of waste in the tank. The indicator is located on the inboard head compartment bulkhead.

Waste Disposal

DOCKSIDE PUMPOUT



This system directs all waste to the 20 gallon holding tank. To clear the tank of waste water, you will need to use the dockside pumpout services provided at marinas, etc.

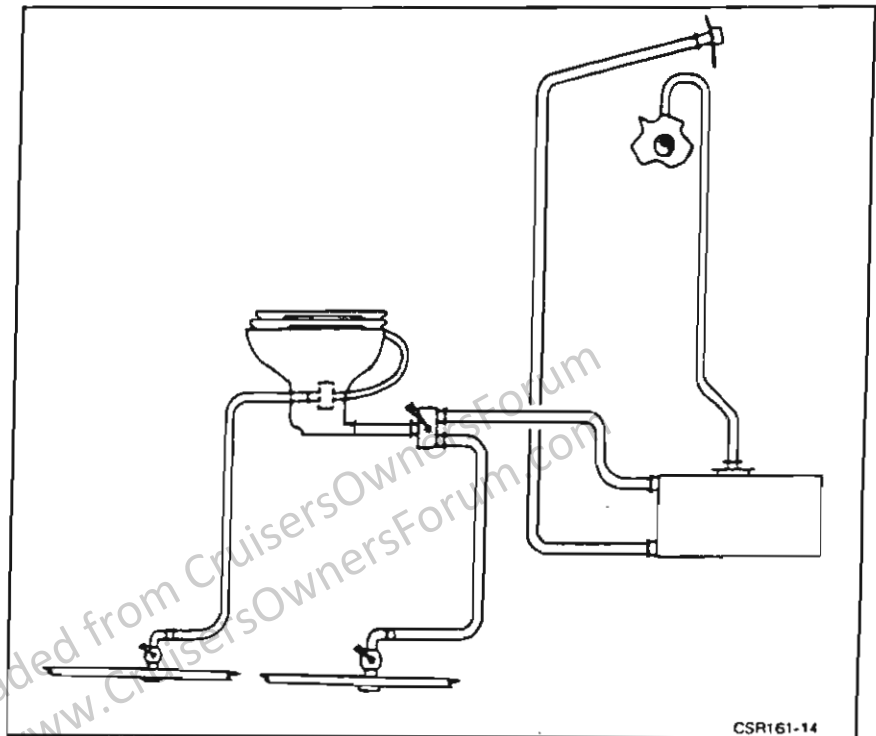
To clear the tank of waste, hook a suction hose to the pumpout plate on the starboard stern of the boat, and to the dockside pump. The marina will handle the proper disposal of the waste.

OVERBOARD DISCHARGE

A "Y" valve is installed, in this version, between the marine toilet and the waste holding tank. The "Y" valve can direct the flow of waste to the holding tank, or direct to an outlet seacock for overboard discharge of waste.

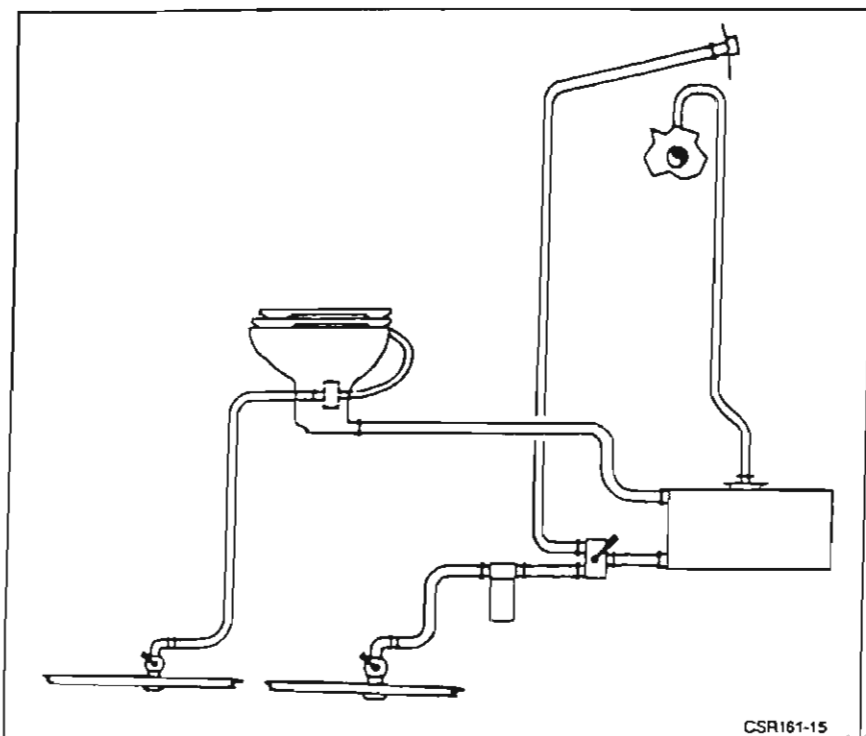
IMPORTANT

Overboard discharge of waste should only be used in approved areas. It is your responsibility to comply with local regulations regarding the discharge of waste.



To operate overboard discharge, the "Y" valve lever must be in the overboard position, and the waste water outlet seacock must be open. Close the outlet water seacock when not in use.

MACERATOR PUMP



A "Y" valve is installed between the pumpout plate and the macerator discharge seacock. The macerator pump is located between the "Y" valve and the macerator discharge seacock. In this configuration all waste is flushed from the head to the holding tank. The "Y" valve permits you to use the dockside pumpout feature, or to use the macerator to pump the waste from the holding tank overboard.

IMPORTANT

Overboard discharge of waste should only be used in approved areas. It is your responsibility to comply with local regulations regarding the discharge of waste.

To pump out the holding tank using the macerator pump:

First, open the 1" seacock labeled MACERATOR DISCHARGE, which is located under the engine hatch.

Second, move the "Y" valve lever to the overboard position. The "Y" valve is below and starboard of the engine hatch.



CAUTION

Do not run the pump dry. Running the pump when there is no waste to pump out of the holding tank will shorten the life of the pump.

shorten the life of the pump.

Third, activate the macerator pump. Push the switch located on a panel in the head compartment. A full tank can be emptied in approximately three minutes.

Fourth, close the macerator discharge seacock after the pumpout is complete.

Head Operating Instructions

MANUALLY OPERATED HEAD

Before operating the head for the first time, read the owner's manual for the marine toilet.

Step 1 - Open the inlet water seacock located under the cabin floor hatch.

Step 2 - If overboard discharge is to be used, make sure the "Y" valve is in the overboard position, and that the macerator discharge seacock is open.

Step 3 - Pump the floor pedal 2-4 times to fill the bowl with water.

Step 4 - To flush, depress foot pedal and operate flush handle next to head at the same time. Operate handle until all waste is removed.

To empty the bowl of excess water, operate flush handle until water level decreases to desired level.

BILGE SYSTEM

IMPORTANT

The discharge of oil or oily waste into or upon the navigable waters of the United States or of the contiguous zones is strictly prohibited by the Federal Water Pollution Control Act. If such a discharge occurs and causes a film or sheen upon, or discoloration of the surface of the water, or causes an emulsion or sludge beneath the surface of the water, the violators are subject to a penalty of \$5,000. Notify the Coast Guard immediately or call toll free 1-800-424-8802 to report any such incident.

The deep part of the hull, where incidental water drains, is called the bilge. Water will enter the boat for a number of reasons, but entry will be particularly heavy during periods of long rains, heavy storms, and high seas. The water that enters is pumped overboard by the bilge pumps. The

Bilge Pumps

Two bilge pumps, one located in the engine compartment and one under the aft cabin floor hatch, are used to remove the bilge water from the boat. The bilge circuit (auto and manual) is not controlled by the battery master switch.



CAUTION

Do not rely upon electric equipment to operate trouble-free. Frequent inspection of the bilge to make sure the pumps are operating properly is a necessity.

The pump can be operated manually, or left in an automatic mode. You can manually operate the pump by turning the appropriate bilge pump switch "on" at the dash panel.



CAUTION

Do not allow pump to run after all the water has been cleared from the bilge area. Damage to the pump will occur if the pump is allowed to operate with no water.

The bilge pumps are operational even when the MASTER BREAKER switch is "off". When water in the bilge reaches a certain level, a triggering device turns the pump on. When the water drains, the pump will automatically shut off.

Blowers (Gas and Diesel)



WARNING

Gasoline vapors can explode! Before starting the engine, check engine compartment for the presence of gas vapors. Operate the blower for at least four minutes before starting the engine. Turn the blower on when idling or operating below cruising speed.

The 2870 model boat is equipped with two 12 volt DC powered bilge blowers which provide ventilation for the engine compartment. The blowers are controlled by the BLOWERS switch on the dash panel.

Section 5 – Getting Underway

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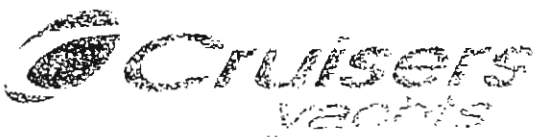
Cruisers

SAFE BOATING

Safety Checks

Safe boating is one of the requirements for pleasant boating! Use common sense and safe practices while enjoying your boat. Use the following safety checks; you are responsible for the safety of your passengers as well as others in and on the water.

- Keep your boat and equipment in good condition; inspect the hull, engines, power train and all gear frequently.
- Use care when fueling boat. Gas in the bilge is extremely dangerous! Make sure there are no fumes in your boat before starting the engine.
- Know your fuel tank capacity and engines' fuel consumption. Be sure you have enough fuel to reach your destination with adequate reserve for course changes due to weather or other problems.
- Regularly check all safety equipment such as fire extinguishers, life preservers, flares, horn, etc. They should be in good condition, readily visible and easily accessed.
- Keep up-to-date navigational charts of areas to be traveled on-board.
- Make a practice of letting someone know your travel plans and route; leave a float plan with someone.
- Check local weather reports before casting off. Watch the weather! Be on the lookout for strong winds and electrical storms.
- Do not overload or improperly load your boat.
- Require good boat shoes be worn by all passengers to avoid slipping.
- Passengers should be instructed how to use all safety equipment. Each person must have a life preserver. Children and non-swimmers should wear life preservers at all times.
- Don't allow passengers to ride on parts of the boat not designed for that use.
- Instruct at least one passenger in the basics of operation and handling of your boat in case you are disabled or fall overboard.
- DO NOT use the swim platform or boarding ladder while the engines are running. Turn engine off when swimmers or skiers are getting in or out of the water.
- Obey all navigational rules!
- If uncertain of water depth, proceed slowly and with caution!



Sample Float Plan

Copy this page and fill out the copy before going boating. Leave the filled out copy with a reliable person who can be depended upon to notify the Coast Guard, or other rescue organization, should you not return as scheduled. DO NOT file this plan with the Coast Guard.

Name _____ Telephone _____

Description of Boat: _____ Type _____ Color _____ Trim _____

Registration Number _____

Length _____ Name _____ Make _____

Other Info. _____

Persons Aboard:	Name	Age	Address & Telephone
-----------------	------	-----	---------------------

_____	_____	_____	_____
-------	-------	-------	-------

_____	_____	_____	_____
-------	-------	-------	-------

_____	_____	_____	_____
-------	-------	-------	-------

Engine Type: _____ HP _____

No. of Engines: _____ Fuel Capacity: _____

Survival Equipment:

PFD's _____ Flares _____ Mirror _____

Smoke Signals _____ Flashlight _____ Food _____

Paddle _____ Water _____ Anchor _____

Raft or Dinghy _____ EPIRB _____

Radio: Yes _____ No _____ Type _____ Freq _____

Trip Expectations: Departure Time _____ Leaving From _____

Destination _____ Est. Time of Arrival _____

Expect to Return By _____

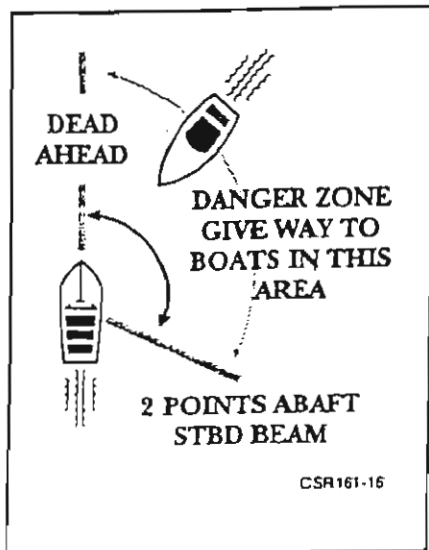
Auto Type _____ License No. _____ Parked _____

If not returned by _____ call the Coast Guard, or _____

(Local Authority). Coast Guard Telephone Number: _____

Local Authority Telephone Number: _____

*Cruisers
Boats*



Boating Rules and Regulations

BASIC RULES FOR SAFE BOATING

- Your boat must be registered and licensed in the state of principle use.
- Give right of way to slower boats, rowboats and sailing craft.
- Keep to the right! Observe the Danger Zone and give right of way to boats in this zone.
- Do not use your motors near swimmers or divers.
- Learn the language of the various buoys and warning signals.

GOVERNMENT REGULATIONS

The Coast Guard is the authority of the waterways; they are there to help the boating public. You and your boat are subject to marine traffic laws and "Rules of the Road" that are enforced by the Coast Guard.

There are many pamphlets, prepared by the Coast Guard, available to you. These pamphlets explain "Rules of the Road", signal lights, buoys, safety, international and inland regulations and more than is discussed here. For more information contact your local U. S. Coast Guard unit. U. S. Coast Guard Headquarters, 1300 E Street NW, Washington, D.C. 20226 or call the Coast Guard Boating Safety Hotline at 1-800-368-5647

There are also many boating safety courses available to the public. Call toll-free "CourseLine" 1-800-336-2628 to find out what courses are offered in your area.

The minimum standards of safety as required by the U. S. Coast Guard for your boat are listed below. You **MUST** equip your boat to meet or exceed these requirements.

- At least one Coast Guard approved, Type I, II or III, personal flotation device (life jacket) for each person aboard. If you are more than 20 miles offshore, you must have Type I.
- At least one Coast Guard approved, Type IV, throwable flotation device - ring or cushion.
- At least two Type B-I or one Type B-II hand-held fire extinguishers.
- At least three Coast Guard approved, hand-held red pyrotechnic (flare-type) distress signals:
Night Use - three aerial red pyrotechnic distress signals
Day Use - three international orange smoke signals
- All pyrotechnic devices must be stowed in waterproof, non-glass containers.
- One hand, mouth or power operated whistle or horn that can be heard for at least one-half mile.
- A bell with a mouth diameter of at least 7.9 inches.

The Coast Guard also recommends you carry an anchor, anchor line, mooring lines, fenders, first aid kit, waterproof flashlight, spare fuses, electrical tape and tool kit.

Signals and Rules of the Road

- Learn and observe the United States Weather signals. Red and black flags are used by day and red and white lights are used at night.

Small Craft Warning

Forecast is for winds up to 38 mph (34 knots) and/or sea conditions dangerous to small craft.

Gale Warning

Forecast is for winds from 39 to 54 miles an hour (34 to 48 knots).

Whole Gale Warning

Forecast is for winds from 55 to 73 miles an hour (48 to 63 knots).

Hurricane Warning

Forecast is for winds in excess of 74 miles an hour (64 knots).

- Obey marker flags.
A red flag with a diagonal white stripe, or the "A" flag, indicates a skin diver in the area.
- A solid orange flag with a black square atop a black ball indicates distress. Either the boat or a passenger is in serious trouble.
- Recognize the different buoys; they are the waterway road markers. There are three types of buoys:

NUN - Cone shape

SPHERE - Spherical shape

CAN - Cylindrical shape

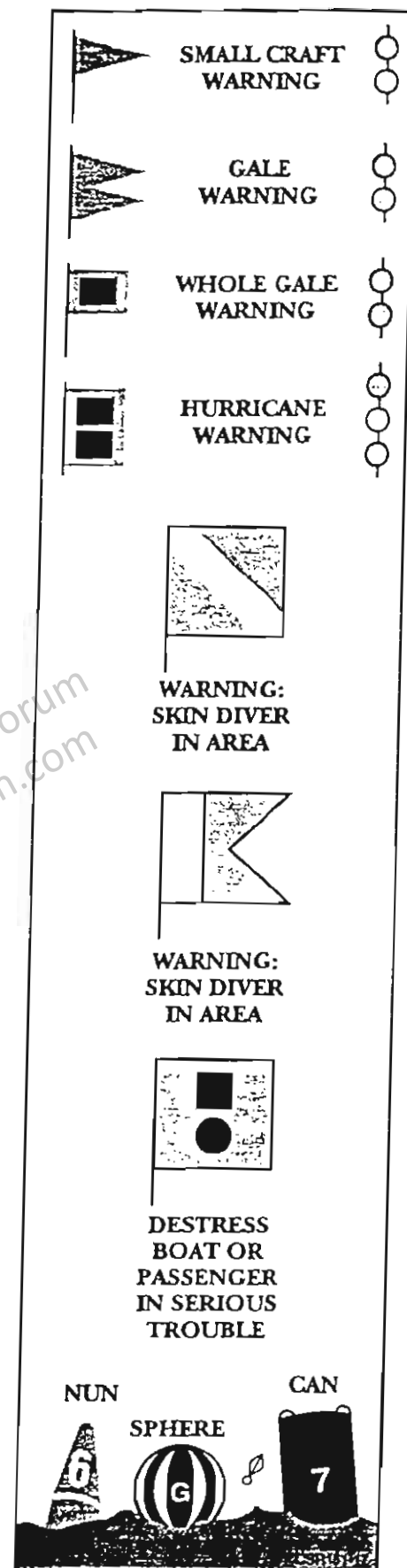
When entering port or going upstream, the PORT (left) side of the channel is marked with GREEN, ODD numbered can buoys. The STARBOARD (right) side of the channel is marked with RED, EVEN numbered nun or spar buoys.

The middle of the channel is marked with RED and WHITE vertically striped spherical or can buoys; always pass close to the buoys. Can buoys will have a spherical topmark.

Obstructions, channel junctions, etc. are marked with RED and GREEN horizontally striped buoys. A RED band at the top means the preferred channel is to the left of the buoy; a GREEN band means the preferred channel is to the right of the buoy. These buoys are sometimes lettered, but never numbered.

Lights, bells and horns are used on buoys for night or poor visibility conditions.

- Know whistle signals!
One Long Blast: Warning Signal (Coming out of slip)
One Short Blast: Pass on my port side
Two Short Blasts: Pass on my starboard side
Three Short Blasts: Engines in reverse
Four or More Blasts: Danger Signal



- If there is a ship-to-shore radio telephone aboard, answer any distress calls. "MAYDAY" is the international signal of distress. NEVER use this word unless there is an emergency and assistance is needed immediately.

DISCHARGE OF OIL

The discharge of oil or oily waste into or upon navigable waters of the United States or of the contiguous zones is strictly prohibited by the Federal Water Pollution Control Act. If such a discharge occurs and causes a film or sheen upon or discoloration of the surface of the water, or causes an emulsion or sludge beneath the surface of the water, the violators are subject to a penalty of \$5,000. Notify the Coast Guard immediately or call toll-free 1-800-424-8802 to report any such incident.

Safety Precautions For Engine Exhaust



WARNING

Do NOT inhale exhaust fumes! Exhaust contains carbon monoxide. Carbon monoxide is colorless, odorless and potentially lethal.

The carbon monoxide present in exhaust fumes can be extremely hazardous. Direct, prolonged exposure will cause brain damage or death. Incoherence, drowsiness, loss of consciousness, headaches, nausea and vomiting are some symptoms of exposure to carbon monoxide.

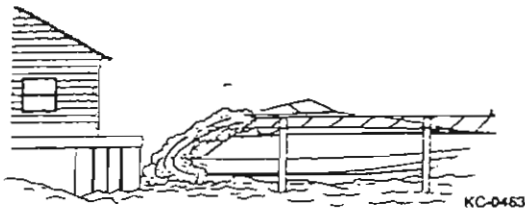
If you think exhaust fumes are entering your boat, correct the problem immediately. Observe the following safety precautions:

- Be alert for the odor of exhaust fumes.
- A natural vacuum created while underway in certain wind and sea conditions may allow exhaust to be drawn into the cabin. Adjust the direction of the boat while underway as necessary to alleviate the presence of exhaust fumes.
- Do not allow the boat to remain stationary with the engine running for any extended period.
- Use care when operating engines or generator in confined areas. Exhaust fumes can enter the boat even with all windows, doors and hatches closed.
- Never operate the generator or leave the engine running if the exhaust port is obstructed.
- NEVER run the engines or generator while everyone onboard is sleeping. If a person is sleeping, be sure adequate fresh air ventilation is provided.
- If your boat is equipped with a forward hatch or windshield side vents, OPEN THEM while underway.
- If you choose to be underway with canvas up, you must vent the forward area to clear the cockpit of fumes.
- Inspect the engine exhaust system frequently for tightness of clamps and hoses. If you notice a change in engine sound, check all exhaust connections.

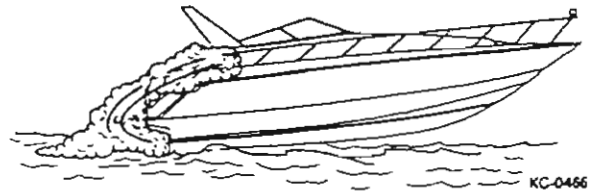
⚠ DANGER ⚠
EXTREME HAZARD

Carbon monoxide gas (CO) is colorless, odorless and extremely dangerous. All engines and fuel burning appliances produce CO as exhaust. Direct and prolonged exposure to CO will cause BRAIN DAMAGE or DEATH. Signs of exposure to CO include nausea, dizziness and drowsiness. Sources of CO include:

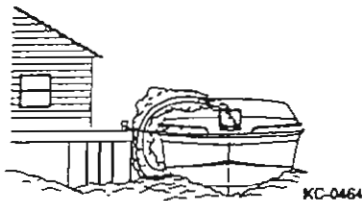
- ❶ Blockage of boat exhausts by obstruction.



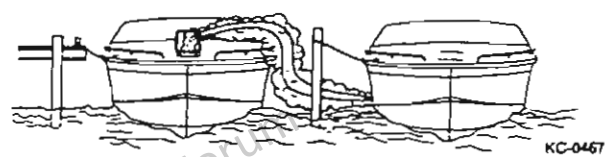
- ❷ Operating with high bow angle.



- ❸ Exhausts traveling along obstruction.



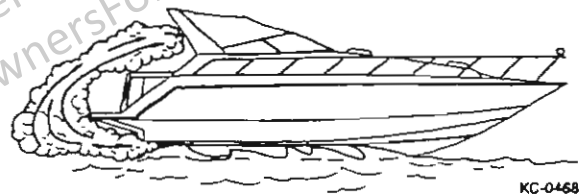
- ❹ Exhausts from other vessels in confined areas.



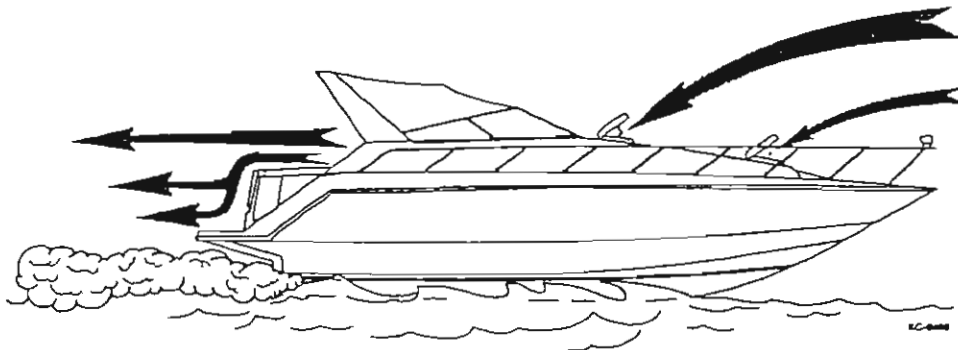
- ❺ Operating at slow speed or while dead in the water.



- ❻ Operating with canvas tops and side curtains in place without ventilation.



To reduce CO accumulation, ventilate the boat interior by opening the windows and/or canvas to provide adequate ventilation. Deck hatches can be opened at slow speed or while dead in the water, but must be closed at or above planing speeds to prevent damage and possible personal injury.



ENSURE ADEQUATE VENTILATION FOR CORRECT AIR MOVEMENT THROUGH BOAT!

OPERATING INSTRUCTIONS

Pre-Start Checklist

Before starting the engine, perform the following checks and procedures:

- See Section 6-PERIODIC MAINTENANCE, Before Every Use.
- Your craft should be securely moored to the dock or slip. The boat should remain moored until the engine is warmed up and properly running.
- Check weather conditions and forecasts.
- Check all life saving devices. Make sure there is one life jacket for each person aboard.
- Check capacity rating plate. Do not leave the dock with an over loaded craft!
- Open windows, doors and engine hatch. Check for fuel fumes and water in the bilge area.
- Place MASTER BREAKER on the DC panel in the "ON" position.
- Operate the bilge blowers for at least four minutes before starting the engine. Allow the blowers to run until cruising speed is attained.
- Check engine oil level.
- Check gas fuel valve to make sure fuel can flow to the engine.
- Head flush water, etc., as equipped.
- Check steering control, and single lever control linkage.
- Check battery charge.
- Check fuel supply.

IMPORTANT

DO NOT rely on the accuracy of the fuel gauge. Readings are only approximate and should always be compared to the hours of use multiplied by the known fuel consumption (GPH).

- Check all electrical components such as the horn, lights, and bilge pump to be sure they are in proper working order.
- Make sure to disengage the shift mechanism (refer to engine manufacturer's manual in the skipper's kit).



Starting

After pre-start checks and procedures have been followed, the engine can be started. Follow the step-by-step instructions below, but be sure to read the Engine Owner's Manual for manufacturer's recommendations.



WARNING

Always start engine with the single lever control in neutral or with shift control disabled. The control in your boat may or may not block the starting circuit if the lever is not in neutral, or shift control is not disabled. Refer to the engine Owner's Manual for starting information.

- Step 1. With the ignition key switches off, put the shift control levers in neutral position.
- Step 2. Move each throttle lever forward to full throttle position and back to idle position. Throttle linkage and cable must move smoothly.
- Step 3. Turn key switch of one engine to START position. Release key immediately after engine starts. The key is spring loaded and will return to the normally on position.



CAUTION

Failure to release ignition key after engine starts may damage the starter motor and drive.

Do not operate starter continuously for more than 10 seconds. If the engine does not start, release key momentarily and try again.

In cold weather, it may be necessary to move the throttle lever back and forth 3 or 4 times while the starter is operating. This will feed more fuel to the engine for starting. DO NOT move throttle lever back and forth if the engine is warm; this will flood the engine.

- Step 4. Operate the engine at approximately 1000 RPM and check the oil pressure gauge. If oil pressure is not within specified range STOP ENGINE IMMEDIATELY and determine the cause.
- Step 5. Repeat starting procedure for the second engine.

IMPORTANT

The second engine may be difficult to hear when it starts due to the noise of the first engine. Observe the tachometer of the second engine. When the RPMs "jump up", release the key switch immediately.



Step 6. Allow engines to warm up. Check engine temperature gauges to be sure water temperature remains within the specified range. If temperature gauge reads abnormally high, STOP ENGINE IMMEDIATELY and determine the cause.

Step 7. Check engine exhausts to see that they are discharging water. Water circulation in the engine and outdrive should take place shortly after starting.

Step 8. Inspect for any fuel, oil, water and exhaust leaks.

Stopping Engine

Step 1. Move throttle control levers to idle position.

Step 2. Disengage the shift controls.

Step 3. Turn key switches counterclockwise to OFF position.

Fueling

Refer to your engine owner's manual for the fuel type and octane rating recommended for your particular engine. Your dealer may have fuel suggestions relative to climate conditions and the use of your boat.



WARNING

All precautions must be taken every time you fuel your boat.

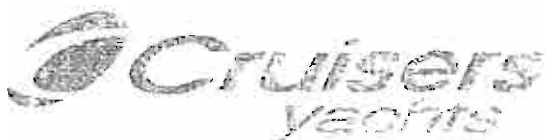
Use the following precautions before fueling to avoid fire and explosion:

- Make sure your boat is securely moored to the dock.
- Stop engines, fans, galley fire and any other device that can produce a spark or flame.
- Close all windows, doors and hatches to keep fumes from entering the boat.
- Disembark all people not needed for fueling the boat.
- Prohibit all smoking in the area.
- Locate the nearest fire extinguisher for use if needed.

While fueling, keep the fill nozzle in contact with fill opening of the tank to protect against any static sparks or spilling fuel.

Do not fill the tank until fuel flows from the vents. Allow room in the tank for fuel expansion.

When tank is full, close fuel opening and clean up any spilled fuel. Wash the areas around the fuel cap and vent. Dispose of rags properly on shore.



IMPORTANT

Spilled fuel may yellow the fiberglass gel coat and damage accent tapes.

Open all windows, doors and hatches. Operate the bilge blowers for at least four minutes. Fuel fumes are heavier than air and will sink to the lowest part of the boat.

Before starting the engines, check for any fumes or leaks in the bilge. Ventilate the boat until the fumes are no longer present. Repair any leaks immediately.

Suggested Maneuvering Techniques

GENERAL GUIDELINES FOR MANEUVERING

- Practice Makes Perfect! Start in calm water with no wind and lots of room until you get the feel for the boat and its controls.
- Maneuvering is accomplished with the engine in gear and propeller turning. At slow speed, with shift control disabled, turning the outdrive has little or no effect on boat direction. With engine in gear, the higher the engine speed the quicker the steering response.
- Recognize the Outside Forces! Check the wind direction and velocity, as well as the water currents. Use the external forces to your advantage when maneuvering; don't fight them.
- Proceed Slowly! Give yourself time to think, react, and maneuver.
- Have the Crew Standing By! Hands ready with fenders, boat hook and lines can assist greatly as you approach a dock.

TURNING



WARNING

High speed, full range turns are not recommended. The quick response of the rack and pinion steering system and the high speed, may cause people and objects to be thrown around inside or even over-board. Exercise prudence in the way your boat is handled!

A gradual turn while moving forward at moderate speed, is accomplished by changing direction of the prop thrust (right, left or center).

DOCK APPROACH

Approach docks on the side that a gentle wind will assist your progress into the dock. Approach from a direction such that you can use your propeller thrust to counteract the wind.

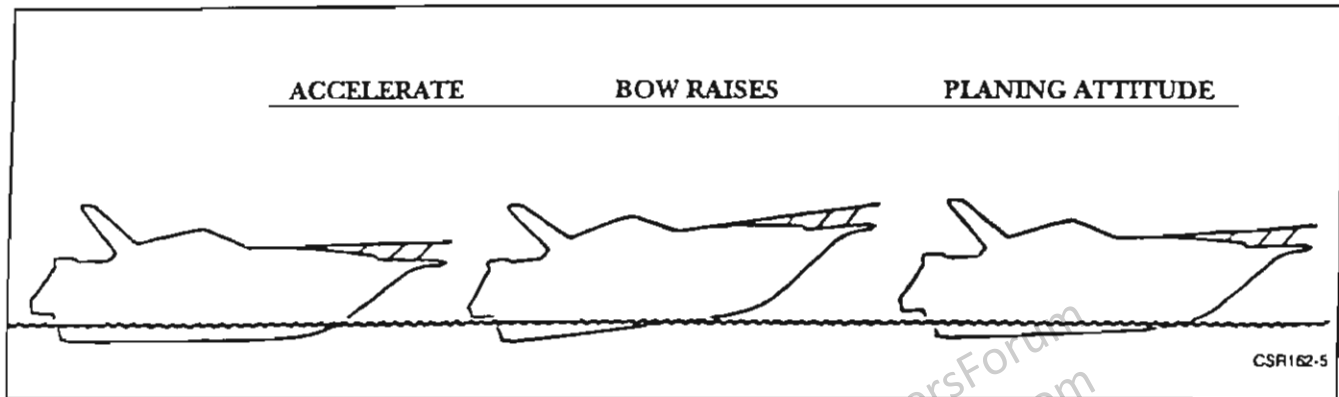


PARALLEL DOCKING

Parallel docking is accomplished best by approaching the dock at a moderate angle, and just as the bow approaches the dock shift to neutral, turn the wheel hard towards the dock and shift into reverse to slow or stop forward motion. At the same time, "pull" the stern towards the dock. More or less throttle is dictated by the relative speed of the boat.

BACKING

Backing is accomplished by using reverse gear and steering the thrust to accomplish the direction of motion desired. Your boat reacts the same way an auto does in the backing maneuver.



TRIMMING THE BOAT

When the boat is accelerated forward, its trim angle increases causing the bow to ride high and the stern low. Continued acceleration will bring the trim angle to a maximum angle ("hump"); then the boat will level out to its planing attitude.

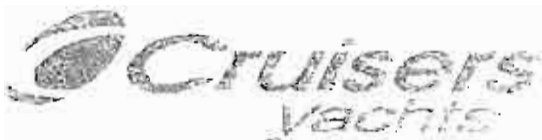
It is important to get "over the hump" as soon as possible due to the reduced visibility, handling and performance. A few seconds at full throttle should get the boat over the hump and into a planing attitude. Once you are "over the hump" and at a comfortable plane, move the throttle control back to 2/3 to 3/4 throttle, a more fuel efficient cruising speed.



WARNING

Do not overtrim. The boat may veer or the bow may dig in causing you to lose control.

Bow "down" trim is normally used when accelerating to cruising speed, operating at slow planing speed, or when running against high waves. Bow "up" trim is normally used for cruising, running with high waves, or running at full speed. Bow position controls to tilt the outdrive are either dash panel mounted or on the single lever control depending on the type of engine installed. Bow position is indicated on the TRIM gauge located on the dash panel.



Your boat is equipped with trim tabs, which can be used to help adjust for trim and list variations caused by load, wind or other variables while underway. If trim tabs are installed, and additional trim is required when accelerating to cruising speed, lower the trim tabs to quickly bring the boat up at the stern and into a planing attitude. As water passes under the hull, it contacts the trim tabs forcing the stern up. Change the angle of the trim tabs to change the rate of lift; lower tabs result in faster lift.

Until you become familiar with trimming your boat, move the rocker switches in half-second intervals. The boat will not react immediately; it will take a few seconds.

The trim tabs can also be used to control uneven weight situations while underway. For a heavy stern, lower trim tabs equally until a comfortable angle is achieved. If the port or starboard is heavy, lower the trim tab on the heavy side to a point where the boat levels out.

Shallow Water Operation



CAUTION

Never attempt to plane the boat or exceed 1000 RPM when the outdrive is in a partially or fully tilted position. Always return the outdrive to the trim range indicated on the TRIM gauge as soon as possible to avoid damage to the engine and outdrive.

Tilting the outdrive, so that you can operate in shallow water, is permissible provided you *do not operate the engine over 1000 RPM*. Exceeding 1000 RPM could damage engine and outdrive components.

When operating in shallow water, be sure the outdrive water intakes are submerged at all times. Operate at slow speed and lower the outdrive immediately when deeper water is reached.

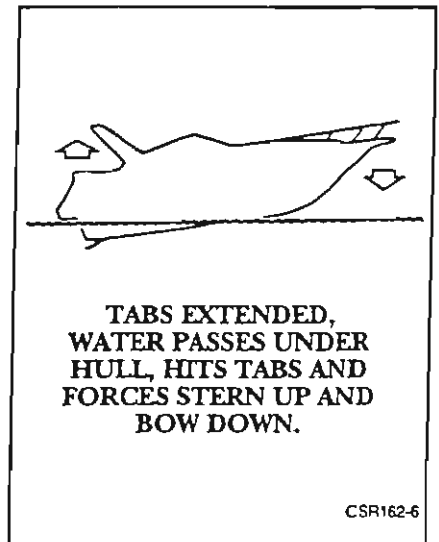
Dropping and Weighing Anchor

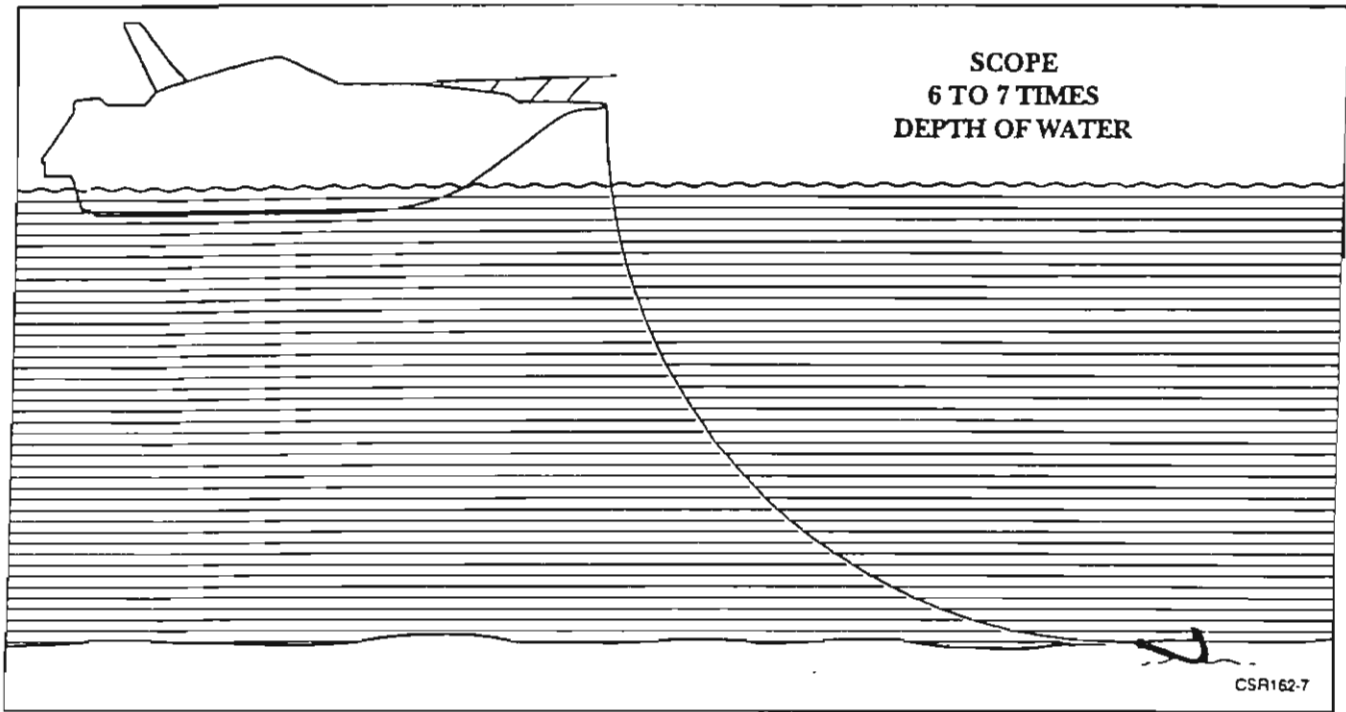
Maneuver the boat over the spot where the anchor is to be lowered, keeping in mind the wind, current, and scope (length of the anchor line). A good gauge for the amount of scope is a length 6 to 7 times the depth of the water anchored in. For example, you are in 10 feet of water, so use approximately 60 to 70 feet scope.

Have a crew member on the bow carefully lower the anchor. When the anchor is on the bottom, keep slight tension on the line. Maneuver the boat backwards slowly until the proper scope has been fed out. Fasten the line around the bow cleat. Anchor flukes should dig in and hold.

Watch for anchor drag by observing shoreline landmarks at the time the anchor is dropped and one-half hour later. If the reference marks have moved, the anchor is dragging and must be reset.

The end of the anchor line should be attached to a mooring cleat. When the line is coiled, it should be done neatly and each coil put around or on top of the previous coil so the line can be fed out smoothly when anchoring.





To weigh (pull in) anchor, it is recommended to have the engines running. Pull in the scope until the line is vertical. Pull hard to lift the anchor's shank and free the flukes from the bottom material.

If the anchor is stuck, attach the vertical, taut line to the bow cleat. Wave action on the bow may lift flukes from the bottom. If the anchor is still stuck, feed out a few feet of line and attach it to bow cleat. Maneuver the boat around the anchor, keeping the line tight. Find an angle that will pull the anchor loose.

Towing the Boat



CAUTION

Do not use deck hardware for grounding and towing! The stress may be too much for cleats and mounting plates. Cleats are designed for mooring use only.

If you are aground, need a tow, or wish to tow another craft, use great care. The boat structure can be damaged by excessive pulling strain.

Use a double-braided nylon rope. Some synthetic fiber ropes stretch too much. Make a bridle for each craft (towing and towed) by putting a rope completely around the hull.



WARNING

Always stay clear of any tight or stretched lines.

If you run aground, depending on the situation, there are a few things you can do.

- Wait for the rising tide to lift you off.
- Shift weight and passengers to heel of the boat. Reverse the prop to back-off.
- Use another boat to carry the anchor to deeper water.
- If all efforts fail, get help from the Coast Guard.

IMPORTANT

You should always offer help to a craft in distress. However, towing a capsized boat, grounded boat or hull-damaged boat is dangerous. Give assistance to the occupants, then call the proper authorities.

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Section 6 – Periodic Checks and Services

PERIODIC CHECKS AND SERVICES	6-2
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PERIODIC CHECKS AND SERVICES

The checks and services outlined in this section are to be accomplished in conjunction with the periodic maintenance outlined in the various owner's manuals contained in the skipper's kit. It is extremely important that you read and understand the periodic maintenance tasks outlined in your owner's manuals (such as the engine owner's manual and the generator owner's manual), because those maintenance tasks are not repeated in this manual.

Use the table below to establish your maintenance routine. The pages which follow provide instructions on how to accomplish each of the required checks and services listed below.

FREQUENCY	TASK
Before Every Use	<ol style="list-style-type: none">1. Check exhaust system for leaks.2. Check seacocks for leaks.3. Check fuel system lines and connections for leaks.4. Check battery charge.5. Check engine oil.
Every 50 Hours	<ol style="list-style-type: none">1. Clean freshwater filter.2. Inspect propellers for damage.
Every 100 Hours	<ol style="list-style-type: none">1. Inspect freshwater system for leaks.2. Clean bilge.
Monthly	<ol style="list-style-type: none">1. Test GFCI outlet.
Quarterly	<ol style="list-style-type: none">1. Check battery electrolyte level.2. Check power steering pump fluid level.
Annually	<ol style="list-style-type: none">1. Check trim tab pump fluid level.2. Lubricate seacocks.3. Check engine mounting hardware.



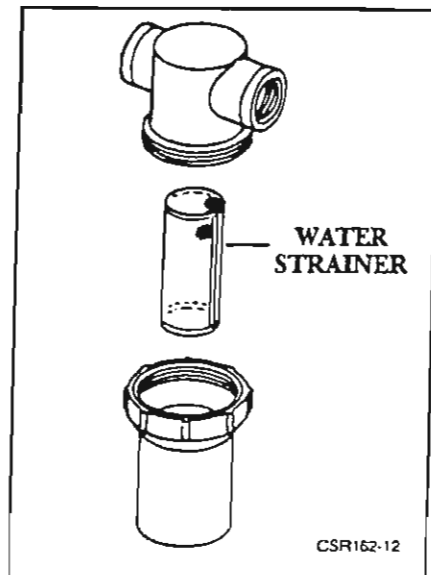
Before Every Use

CHECK THE COCKPIT WASH DOWN SEAWATER STRAINER FOR
LEAKS AND ACCUMULATION OF DEBRIS

NOTE

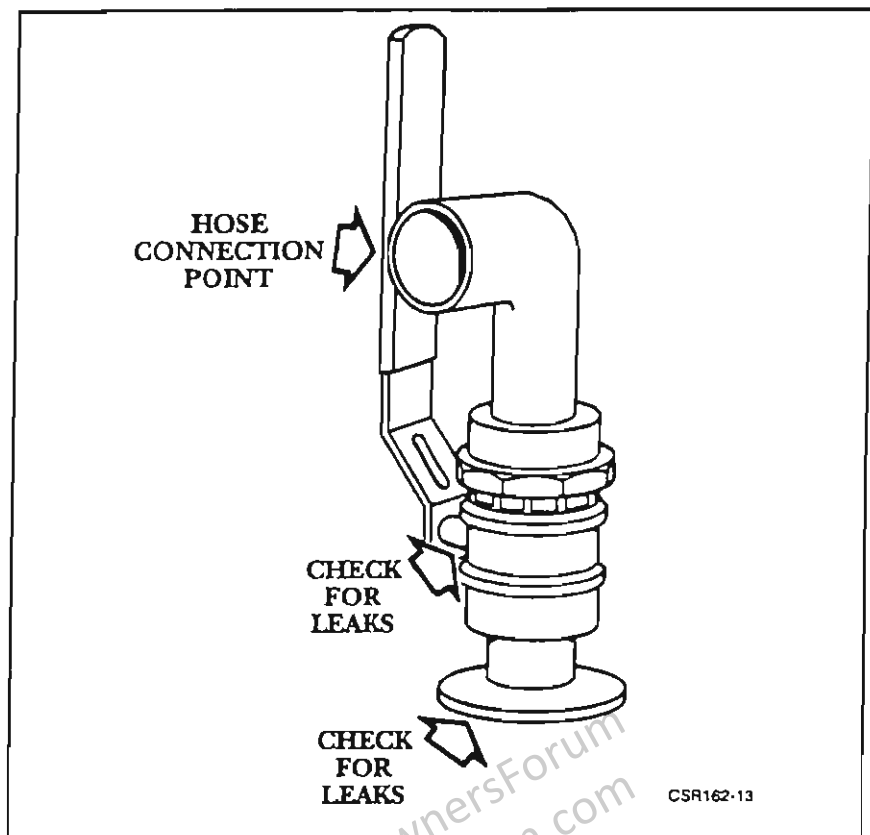
The cockpit washdown strainer is located in the engine compartment.

1. Inspect hose connections to and from the strainer for leakage.
2. If hose is damaged or leaking, close the cockpit washdown seacock to prevent any further entry of water, and then replace the damaged hose and clamps. See your authorized Cruisers dealer for parts and service.
3. Inspect container for build-up of debris which can clog the strainer and cause a system failure. If strainer needs to be cleaned, do the following:
 - a. Close cockpit washdown seacock.
 - b. Remove strainer cover.
 - c. Lift strainer from container and use a stiff brush to clean. Rinse with clean water, and return to container.
 - d. Fasten cover to container, and remember to open seacock before operating.



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CHECK SEACOCKS FOR LEAKS



1. Check the following seacocks:

Engine cooling water seacock located in the engine compartment (only on V8 engines with freshwater cooling).

Head inlet water seacock located below main cabin floor hatch.

Head outlet water seacock located in the engine compartment.

Cockpit washdown seacock located in the engine compartment.

2. Inspect hose connections at seacock for leaks.



CAUTION

When replacing hoses, make sure that the appropriate seacocks are closed.

If hose is leaking, tighten hose clamp. If hose is damaged, replace the hose and clamps. See your Cruisers dealer for parts and service.

3. Inspect seacocks for signs of leakage at base and handle.



CAUTION

Seacocks can only be replaced when the boat is out of the water.

If leakage is apparent, take your boat to a Cruisers dealer for immediate service.

CHECK FUEL SYSTEM LINES AND CONNECTIONS FOR LEAKS

1. Check all lines and connections at the fuel tank, and at the engines.



WARNING

DO NOT operate the engine when fuel leaks have been detected. All fuels are combustible and gasoline vapors are explosive. Repair leak before starting the engine.

2. Tighten any connection that may be leaking. If problem persists, or fuel lines are damaged, refer the problem to your Cruisers dealer.

Every 50 Hours

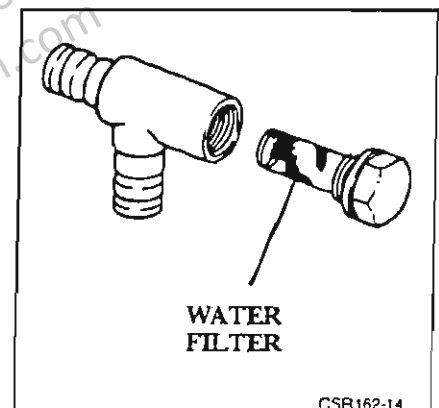
CLEAN SEAWATER STRAINERS

Refer to "Check Strainers" in "Before Every Use."

CLEAN FRESHWATER FILTER

IMPORTANT

Freshwater system must be completely drained before attempting to service filter.



1. Remove nut and washer from filter.
2. Remove screen from housing and flush with clean water. Use a brush to remove any sediment.
3. Return screen to housing, and install nut and washer.

INSPECT PROPELLERS FOR DAMAGE

1. Check propellers for bends, cracks, and pitting.
2. Do not continue to use a badly damaged propeller. A damaged propeller must be replaced. See Section 8 for details.



Every 100 Hours

INSPECT FRESHWATER SYSTEM FOR LEAKS

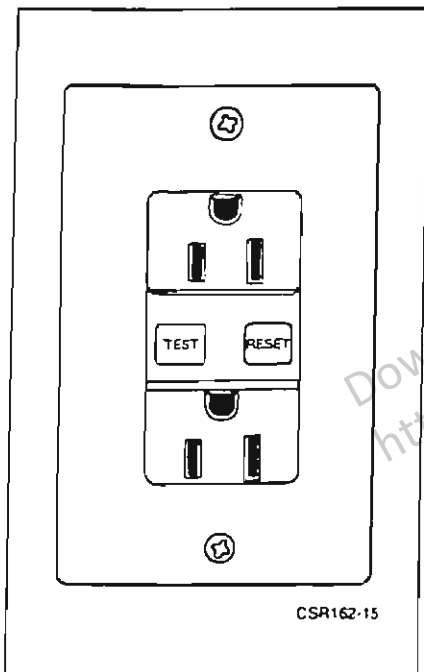
1. Fill and pressurize freshwater system.
2. Inspect connections at freshwater reservoir, filter, and pump. There should be no signs of leakage. If leaks are apparent, drain system and replace defective hoses, tubes, and clamps. See your Cruisers dealer for parts and service.
3. Inspect connections at hot water heater. There should be no signs of leakage. If leaks are apparent, drain system and replace defective hoses, tubes, and clamps. See your Cruisers dealer for parts and service.

CLEAN BILGE

See Section 8, GENERAL MAINTENANCE for details.

Monthly

TEST GFCI OUTLET



1. Provide AC to the boat with shore power hookup. Turn the appropriate breaker(s) on.
2. Turn the AC master panel circuit breakers "on."
3. Locate the GFCI circuit breaker.
4. Push the test button on each GFCI outlet. Power should be interrupted to all outlets. Press the reset button to restore power.
5. If power is not interrupted, do not use any of the outlets. Have a qualified electrician make the necessary repairs.

Quarterly

CHECK BATTERY ELECTROLYTE LEVEL

See Section 8, GENERAL MAINTENANCE for details.

CHECK POWER STEERING PUMP FLUID LEVEL

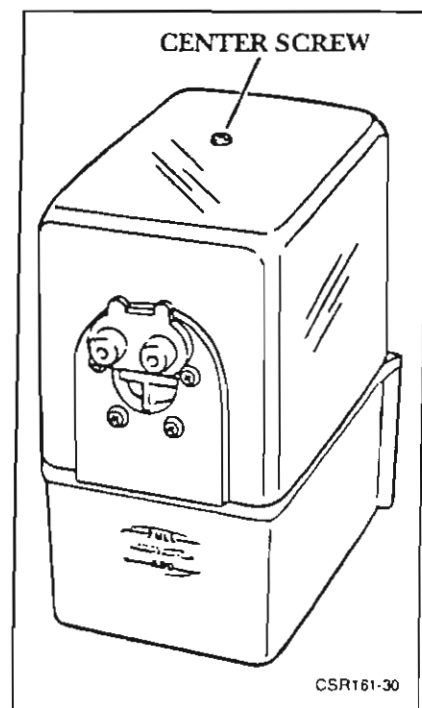
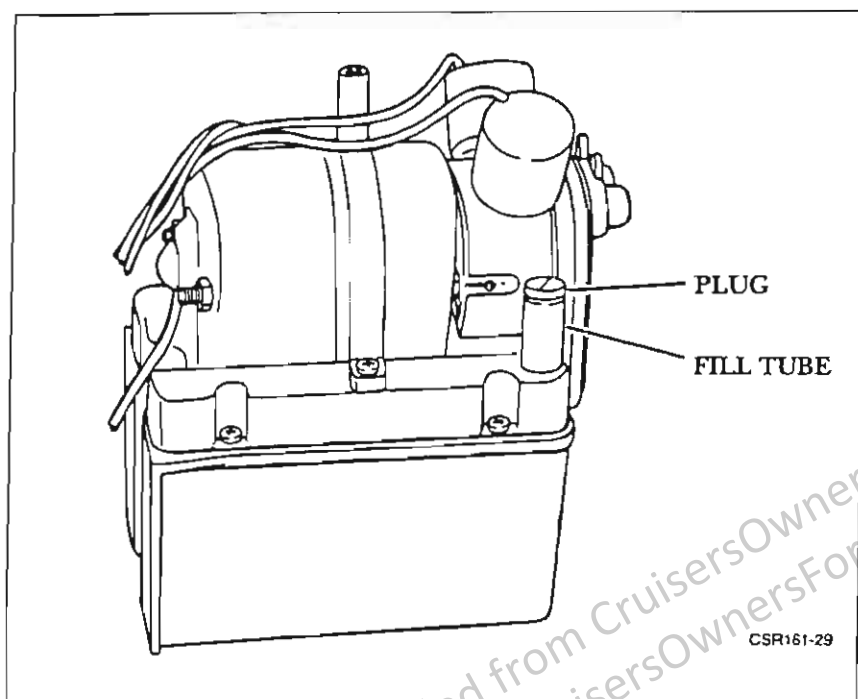
Refer to the engine manufacturer's owner's manual.

Annually

CHECK TRIM TAB PUMP FLUID LEVEL

1. A fluid level line has been added to the oil reservoir of the trim tab pump. The oil level is visible through the translucent sides of the reservoir.
2. If oil is low, replenish in the following manner:

Remove plastic cover by unscrewing center screw.



Remove plug from fill tube, and use a funnel with a tube to add lubricating oil. Fill only until oil reaches the full line indicated on the reservoir.

LUBRICATE SEACOCKS

1. Lubricate the following seacocks:

Engine cooling water seacock (only on V8 engines with fresh-water cooling).

Head inlet water seacock and head outlet water seacock.

Cockpit washdown seacock.

2. Use lubricating oil and lubricate the wing screw threads, and the valve handle at its pivot point.

CHECK ENGINE MOUNTING HARDWARE

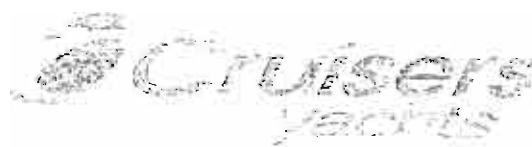
Check engine mounting hardware for looseness and tighten if necessary.



Section 7 – Storage for Extended Lay-Up

STORAGE FOR EXTENDED LAY-UP	7-2
Lifting and Storing Your Boat - Stern Drive	7-2
Transporting	7-3
Winterization	7-4
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STORAGE FOR EXTENDED LAY-UP

Lifting and Storing Your Boat - Stern Drive



CAUTION

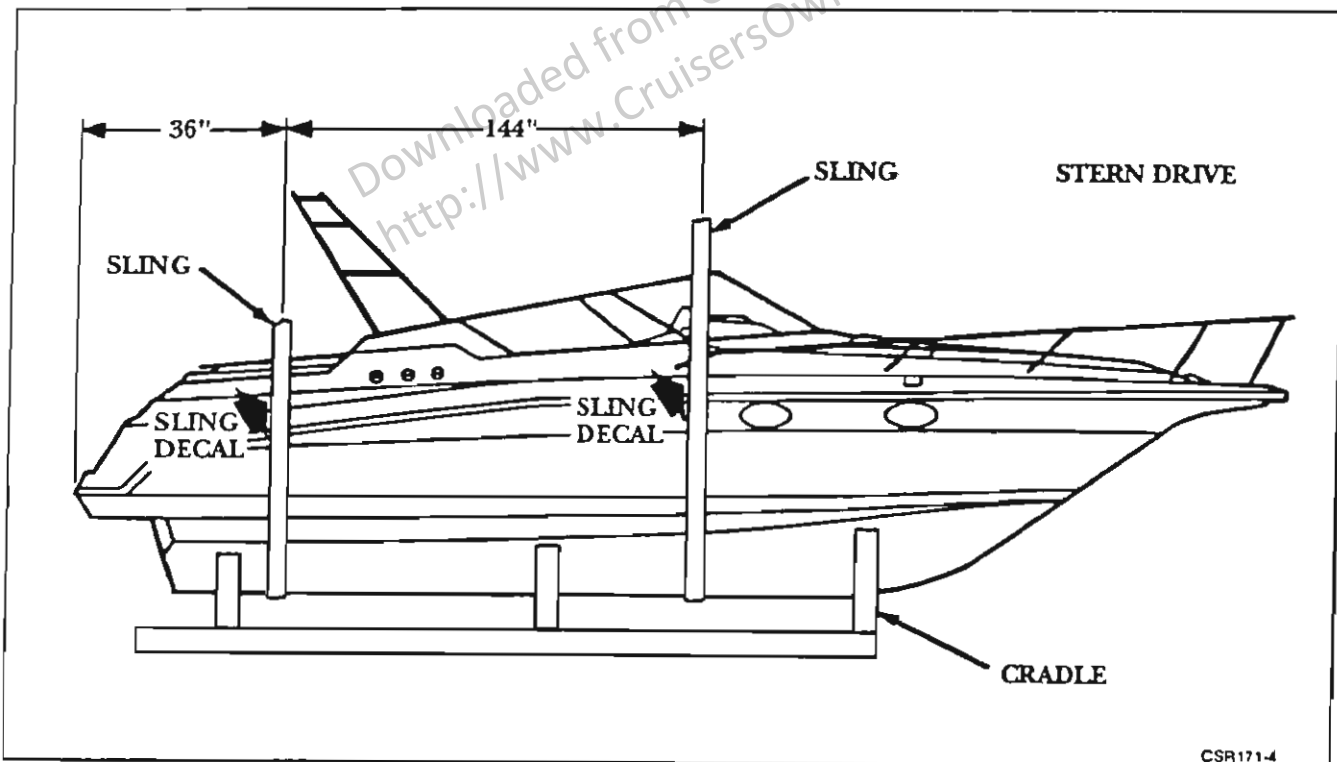
Never lift a boat with a large amount of water in the bilge! Undue stress will be put on the hull.

Slings must never contact or exert a force on hardware protruding from the hull. This type of stress can damage fiberglass, bend or misalign parts, which is not covered under the warranty.

Use two web slings and 11 foot spreader bars to lift the boat. Slings must have a minimum width of six inches and a capacity rating high enough to support the boat. Spreader bars reduce the side pressure at the boat's sheer line and prevent distortion or damage to the deck or gunwale molding.

Put slings around the hull at positions marked "SLING". The sling decal is located just under the gunwale molding. Make sure the sling contacts the bottom of the hull for the entire length with no twists in the sling.

When lifting the boat, keep the bow slightly higher than the stern to keep water from running into engine manifold. Water can cause corrosion or damage to the engine.



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CAUTION

When your boat is out of the water, it is important to support the hull correctly to avoid any hull damage.

The shipping/storage-cradle will provide the proper support at the recommended positions. The load at the cradle support areas is less than 10 pounds per square inch. Make sure the cradle is level and completely supported on the ground to eliminate any cradle or hull distortion. Contact your Cruisers dealer to order a cradle.

If a factory-supplied cradle is not available, extreme care should be used to support the hull as shown above. Do not support boat by resting hull on keel; the load will be more than 10 pounds per square inch! Vertical supports must extend from chine to keel to chine with no gaps between the hull and cradle supports. Protect all items extending from the hull from resting on the support or ground. DO NOT apply any load stress to props, stern drives or trim tabs.

Transporting

The boat must be supported on a trailer with the same care and concern as on the ground. Cover the boat to prevent additional load being added from rain or snow. Contact your dealer for assistance in transporting your craft.

Transporting Checklist

- Check all federal, state and local regulations and requirements to transport your boat. Arrange for any permits and escorts as required.
- Place outdrives in full tilt "up" position.
- Disconnect and remove batteries to prevent accidental sparks and spilled electrolyte.
- Empty fuel tanks to prevent fuel fumes, spilling and possible fire.
- Empty freshwater system to reduce transportation weight.
- Remove all items from cabinets, pockets and drawers to eliminate damage.
- Secure all drawers, cushions, doors, etc. to prevent any cabin damage from items moving around during transport.
- Secure hatches, windows, doors and canvas to prevent damage from wind and accidental opening.
- Cover and tie the boat down securely to avoid any shifting, tipping or sliding during transport.

Winterization



CAUTION

If improperly stored, the boat could take on water which can accumulate and cause damage to onboard systems.

If your boat is to be stored on shore, a thorough winterizing procedure will extend the life of your boat and its equipment. Utilize the following suggestions to make boat prep for the next boating season a little easier.

- a. Clean the hull and deck as soon as the boat is pulled from the water. This will make cleaning easier because the marine growth will still be wet. (See the Care and Cleaning section in this manual.)
- b. Store the boat with the bow up so any accumulation of moisture will run off. Remove transom drain plug to allow any bilge water to drain out.
- c. Inspect the hull and underwater gear for signs of deterioration, wear or damage. Note any damages to engine outdrive, cabin equipment, helm area, etc. that has occurred during the past boating season. Try to have any repairs made before covering the craft.
- d. Fuel System:

IMPORTANT

Do not fill the tanks so fuel flows from the vents.
Allow room in the tanks for expansion.

1. Fuel tanks should be filled with treated fuel to prevent condensation. Use the following products per instructions on container.
Gasoline- use a stabilizer and conditioner, such as "STA-BIL."
Diesel- use a biocide, such as "BIOBOR" and conditioner, such as "RAYCOR RX 100."
 2. Run engines for ten minutes to make sure treated fuel is present in all lines and parts of the engines.
- e. Engines:
1. Flush engines with clean fresh water.
 2. Refer to the engine owner's manual for procedures to store and winterize the engines.



f. Head and Holding Tank:

1. Empty and rinse holding tank with water until tank is clean.
2. Close head intake seacock and remove hose from seacock.



WARNING

DO NOT use automotive type radiator antifreeze under any circumstances! It is poisonous. See your marine or recreational dealer for non-toxic antifreeze.

3. Put hose into a bucket of non-toxic antifreeze. Keep flushing the head until antifreeze reaches the holding tank.
4. If equipped with macerator discharge and the boat is removed from the water, operate macerator pump just long enough so antifreeze runs through pump and lines.
5. Remove drain plug from seacock while seacock is closed. Allow line to drain. Replace drain plug.

g. Cockpit Wash System:

1. Close intake seacock and remove intake hose.
2. Put hose in a bucket of non-toxic antifreeze. Operate system until antifreeze solution is discharged from system.
3. Turn system off and relieve pressure in hose, if connected.
4. Remove drain plug from cockpit wash seacock. Allow to drain and replace drain plug.

h. Bilge Pumps:

In areas where temperatures are below freezing, the bilge must be pumped out and sponged completely dry. Check for areas that do not drain completely to the pumps.

i. Sink Drain:

Pour non-toxic antifreeze in all sink drains until the antifreeze is discharged overboard.

j. Freshwater System:

1. Place MASTER BREAKER switch in the "off" position.
2. Remove the freshwater supply by opening the hot and cold faucets in the galley for 10 minute intervals. Repeat the procedure until the freshwater tank is empty.
3. Open all faucets onboard - galley, shower, cockpit shower, etc.
4. Disconnect inlet and outlet hoses from freshwater pump.

5. Remove freshwater filter bowl and strainer. Clean, dry and replace strainer bowl.
6. Drain the water heater. Lines from the engine heat exchanger must be disconnected. Drain exchanger and lines.
7. Use low air pressure at freshwater pump outlet hose to blow water from all water lines.
8. Attach a hose to inlet side of freshwater pump. Put the other end of the hose into bucket of non-toxic antifreeze and operate pump until the antifreeze comes out the outlet side of pump. Connect inlet and outlet hoses back onto the pump.

k. Refrigerator:

1. Check that MASTER BREAKER switch is in the "off" position.
2. Wipe unit dry and leave the door blocked open during storage.
- l. Remove strainer and seacock drain plugs to prevent damage from freezing. Close all seacocks.

Strainers

Engines

Freshwater system

Cockpit wash system

Seacocks

Engines

Cockpit wash (intake)

Head system (intake)

Head system ("Y" valve overboard discharge)

Head system (macerator pumpout)

m. Batteries:

1. Be sure the MASTER BREAKER switch is in the "off" position. Remove batteries from the boat and store in a nonfreezing area.
2. Put batteries on a wooden pallet or bench.
3. Keep batteries on a trickle charge. Check and maintain electrolyte levels regularly.

q. Interior Preparations:

1. Remove items that will hold moisture and cause mildew such as life jackets, towels, blankets, cushions, mattresses, clothing, curtains, canvas, etc.
2. Scrub the inside of the boat. Clean the cabinets, drawers, and cupboards. Try to allow one day for drying and airing out the cabin area, as weather permits.
3. If mattresses and cushions are left onboard, stand or prop them up to allow good air circulation around them. Hang life preservers and other equipment also, to avoid mold and mildew.



o. Exterior Preparations:

1. The bottom will require at least one coat of anti-fouling paint before beginning a new season. This can be done when winterizing or at the start of the new season. Consult your Cruisers dealer for paint specifications for your area.
2. Apply a coat of wax to the entire surface of the boat. Put rust inhibitor on all deck hardware and other metal parts. Consult your Cruisers dealer for product recommendations.

NOTE

If possible, do not seal cabin or cockpit tightly.
Dry, fresh air will ventilate these areas preventing mold and mildew.

- p. Cover your boat with a tarpaulin or mooring cover. If the boat is stored outside, additional supports under the tarp or cover may be necessary to prevent pockets that will collect snow or rain. This can add extra load to the hull and cradle; also stress the cover, possibly tearing it.

Fitting Out After Storage

A thorough check of your boat after an extended storage period for any type of damage is necessary. Look for items such as cracks or breaks due to freezing, fiberglass stress cracks in hull or deck, fuel or water leaks in seals or seams. The following steps will assist you in getting your boat back into the water.

- a. If anti-fouling paint and wax was not applied before your boat was stored, apply them now.
- b. Inspect all through-hull fittings for tightness and possible leakage. Do not overtighten.
- c. Inspect the entire fuel system for leaks or deterioration. Replace parts as necessary.
- d. Open and close all seacocks to check operation. Install all drain plugs in strainers and seacocks.
- e. Check all hoses and fittings for cracking, splitting or deterioration. Replace defective parts immediately.
- f. Install transom plug if it was removed during storage.



g. Batteries:

1. Make sure battery or batteries are fully charged and the electrolyte level is approximately 1/2 inch above the internal plates.
2. Clean battery posts and cables. Use a solution of baking soda and water to clean battery cases.
3. Install batteries and connect battery cables. Apply a small amount of grease or petroleum jelly to cover the posts and cable clamps.
4. Turn MASTER BREAKER switch to the "on" position.

h. Connect all hoses that were disconnected for winter storage.

i. Freshwater System:

1. Close all faucets onboard.
2. Fill freshwater tank with approximately 10 gallons of pure drinking water. Turn freshwater pump circuit breaker to "on".
3. Open hot and cold faucets in galley slightly to allow air to escape and fill water heater. Close the faucets when a steady flow of water is present.
4. Bleed air from all remaining faucets as in step 3.
5. The pump will run until operating pressure is reached and will then shut off. Continue to fill freshwater tank to its capacity (30 gallons).

j. Refer to engine owner's manual for procedures to put engine into service after an extended storage.

k. Put miscellaneous equipment such as mattresses, cushions, curtains, life jackets, etc. onboard.

l. Make sure all seacocks are closed and launch boat.



CAUTION

Remain with the boat for a minimum of 8 hours after launching the boat. This will allow time to check hull for any leaks and correct the problem before the boat is swamped.

Section 8 – General Maintenance

GENERAL MAINTENANCE	8-2
Engine Power Systems	8-2
DC Electrical System	8-2
Freshwater System	8-2
Bilge	8-3
Hull	8-3
General Care and Cleaning	8-4

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GENERAL MAINTENANCE

Engine Power System

Refer to the engine manufacturer's manual located in the skipper's kit.

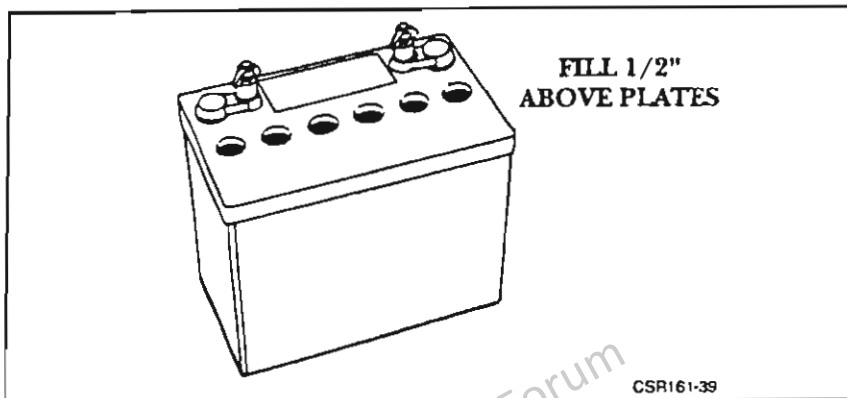
PROPELLER REPLACEMENT

It is recommended that propeller replacement, if necessary, be done by an authorized Cruisers Dealer.

DC Electrical System

CHARGE BATTERIES

Battery electrolyte levels should be checked regularly and kept at approximately 1/2 inch above the battery plates by adding distilled water.



To charge the batteries using AC shore current, move the BATT CHGR circuit breaker on the AC Power No. 1 panel to the "on" position. You can charge the battery or batteries using AC shore power, with the battery charger and a dockside power hookup.

Freshwater System

CLEAN THE WATER TANK

Fill the freshwater tank using a plastic hose. Rubber hoses can add an objectionable taste to the water.

To clean your new freshwater system, or the system after a long period of storage, use the following procedure:

1. Make a solution of 2-1/2 cups (20 oz.) of household bleach and 10 gallons of water.
2. Pour the solution into the empty tank and fill the tank with fresh water.
3. Start the freshwater pump and bleed all the air from the fresh water system. Start with the faucet farthest from the pump.
4. Allow the treated water to stand for 3 to 4 hours.
5. Drain the tank and lines. Flush the entire system with clean fresh water. Fill the tank with freshwater.
6. If an excessive chlorine taste is still present, make a solution of 1 quart of vinegar and 5 gallons of water. Add the solution to the system and let it remain in the system for several days.
7. Drain the system and flush with clean freshwater. Fill the tank and bleed the air from all the lines.

Bilge

CLEAN THE BILGE AREA

Pump bilge area dry and remove all loose dirt.

After time, the bilge will collect dirt and oil. **DO NOT** use flammable solvents to clean the bilge. Frequent cleaning with a commercial bilge cleaner will loosen oil and dirt and make cleaning easy. Consult your Cruisers dealer for instructions and use.

Hull

GELCOAT CARE

A complete washdown of all exterior gel coated surfaces with a mild detergent and clean water after each outing is recommended. **DO NOT** use detergents that contain ammonia or chlorine. Alcohol or kerosene may be used for stubborn stains. Light sanding and buffing will remove most stains and shallow scratches.

In areas where your boat is stored for winter months, a pre-launch waxing for the season should suffice. In southern areas, wax the exterior surfaces at least semi-annually. A specially formulated fiberglass wax is recommended to prevent any color fade and soil adhesion. If waxing alone does not bring back the shiny appearance, hand buffing with DuPont #7 Rubbing Compound or power buffing with Mirror Glaze #1 may be necessary.

GELCOAT REPAIR

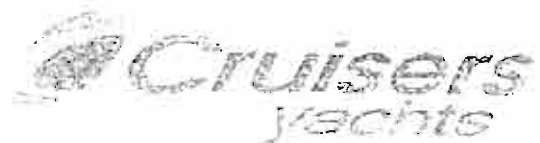
Scratches or blemishes in the gelcoat may detract from the appearance of your boat, but they do not affect the strength or integrity of the fiberglass hull or the component which the gelcoat covers.

A gelcoat repair kit (available from your authorized dealer) permits the user to repair minor scratches and nicks in the gelcoat.

Minor scratches can be removed by wet sanding. Start with 320 grit first, sanding lightly until the scratch starts to disappear. Use 400 grit until the scratch is gone. Finish sanding with 600 grit and buff the area with rubbing compound. Rub hard at first and then lighten up to polish the area.

FIBERGLASS REPAIR

"Fiberglass" refers to fiberglass reinforced plastic construction of the hull, deck, and cabin fabrications beneath the thin gelcoat skin. Fiberglass repairs require the use of special tools and following precise repair instructions. Your Cruisers dealer is skilled in handling these repairs and also has available fiberglass repair kits for boat owners to make their own repairs, if capable.



If you decide to make repairs yourself, tools and materials you will need are:

- Fiberglass Repair Kit
- Acetone
- Resin
- Hardener
- Fiberglass
- 400 and 600 Grit Wet Sand Paper
- Polishers/Buffer
- Automotive-Type Rubbing Compound
- Putty Knife

An excellent resource booklet for instructions on small fiberglass repairs is "HOW TO REPAIR FIBERGLASS BOATS," published by Ferro Corporation, Nashville, Tennessee, 37211.

ANTI-FOULING BOTTOM PAINT

Before selecting a bottom paint, talk with other boaters and your dealer to determine which product works best in your area. Many variables affect the bottom paint such as water temperature, pollution, salinity, currents, suspended dirt and organic matter, and sunlight.

Fiberglass hulls should never be sanded, cleaned, painted and launched in the same day. Moisture in the old paint must be allowed to escape completely to get good adhesion between the new and old paint. Also, allow sufficient drying time before launching your boat; follow paint manufacturer's suggestions.

General Care and Cleaning

DECK FITTINGS AND HARDWARE

Stainless steel has been used wherever possible on your boat. It is not totally resistant to corrosion. Regular cleaning and polishing with a chrome or stainless steel polish will maintain and extend its life. A daily rinsing with clear water to remove any salt residue is suggested. A light wipe-down with WD-40 or LPS sprayed on a soft rag after each washdown will enhance its appearance.

Inspect all screws, clamps and fittings. Tighten any loose hardware when necessary.

EXTERIOR AND SEAT VINYL

Regular washing with mild soap and warm water or vinyl upholstery cleaner is sufficient to keep the cushions and vinyl coverings in good condition. Keep the cushions from becoming water soaked to prevent any mildew accumulation. Wipe the cushions dry and lightly spray them with Lysol to help prevent mildew.

INTERIOR WALL COVERINGS AND OVERHEAD

Vinyl interior wall coverings may be sponge-cleaned with quality vinyl cleaners or with a 50/50 solution of mild detergent and water. Blot dry with a clean cloth after cleaning.

The interior overhead may be cleaned with upholstery cleaner.

WINDOWS

- Plexiglass and Vinyl Windows.

First, flush the plexiglass and vinyl with clean water. Use your bare hand with plenty of water to loosen any dirt. A clean soft rag may then be used with a mild non-abrasive soap or detergent. Dry carefully with a soft damp cloth or chamois.

- Sliding Windows.

Avoid cleaners containing sodium or calcium hypochlorite or cleaners that give off a chlorine odor. These types of cleaners can damage the nylon pile window channel runners.

BIMINI TOP, SIDE CURTAIN AND CAMPER TOP FABRIC

Sunbrella® is made from 100% acrylic fiber. It is guaranteed for a period of five years against loss of color or strength from normal exposure conditions including sunlight, mildew, rot, and atmospheric chemicals. It is a solution dyed fabric which gives it a color rightness which is unsurpassed. Being a woven fabric it breathes, and is translucent, both of which are desirable characteristics.

Sunbrella® has a fluorocarbon finish which provides excellent water repellency.

CARE AND CLEANING

1. *Sunbrella®* fabric should be cleaned regularly before substances such as dirt, roof particles, etc., are allowed to accumulate on and become embedded in the fabric. The fabric can be cleaned without being removed from the frame. Simply brush off any loose dirt, roof particles, etc.; hose down and clean with a mild natural soap in lukewarm water (no more than 100°F). Rinse thoroughly to remove soap. **DO NOT USE DETERGENTS.**
2. Another method of cleaning for more stubborn cases is as follows: Soak the fabric for approximately twenty minutes in a solution of no more than 1/2 cup (4 oz.) Clorox and 1/4 cup (2 oz.) natural soap per gallon of water at approximately 100°F. Rinse thoroughly in cold water to remove all of the soap. Note: Excessive soaking in Clorox can deteriorate sewing threads. This method of cleaning may remove part of the water repellency and the fabric should receive an application of an air-curing water repellent treatment, such as Barpellent, APCO, or similar products, if water repellency is a factor.
3. *Sunbrella®* may be dry cleaned but a water repellent treatment must be applied to the fabric after dry cleaning to reestablish water repellency. *Sunbrella®* is made from 100% acrylic fiber and is thermoplastic or heat sensitive. When washing or cleaning, **DO NOT SUBJECT TO EXCESSIVE HEAT** as the fabric will shrink. **DO NOT STEAM PRESS OR DRY IN ELECTRIC OR GAS DRYERS**, but allow to air dry.



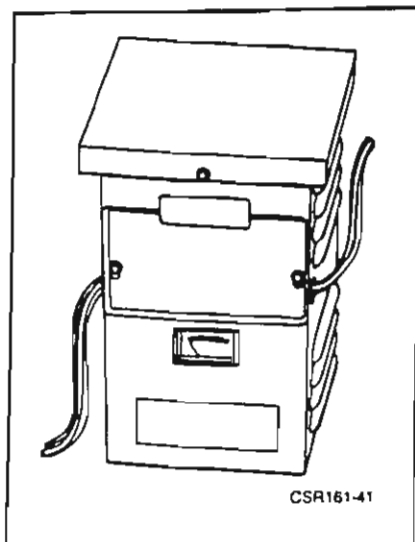
4. In cases where a *Sunbrella®* awning is taken down and stored during the winter season, it should be cleaned, allowed to air dry, and stored in a dry, well ventilated area. Many fabricators offer a reasonably priced removal, cleaning, storage, and rehanging service on a yearly basis.
5. For optimum appearance and performance *Sunbrella®* should be cleaned regularly.

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Section 9 – Accessory Items

ACCESSORY ITEMS	9-2
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ACCESSORY ITEMS

Battery Charger

The battery charger can provide continuous battery charging. When the charger receives power from shore or the auxiliary generator, it converts AC power to 12 volts DC power and distributes the charge automatically to any or all batteries as needed.

To operate the battery charger, the BATT CHGR circuit breaker on the AC Power No. 1 panel, must be in the "on" position.

For further information on the battery charger, refer to the owner's manual in your skipper's kit.

Stereo System

The stereo system is to the port side of the cabin (see Section 2). The system has speakers located in the cockpit and cabin areas.

See the stereo system information in the skipper's kit for operation and care of the stereo.

Cockpit Shower

The shower head, hose, hot and cold valves are located in the portside of the cockpit (see Section 2). The shower is functional only when the freshwater system contains water and the MASTER BREAKER switch is on.

Cockpit Washdown

The cockpit washdown control panel is in the portside of the cockpit (see Section 2). The seacock, located in front of the engine, must be open to avoid damage to the pump.

The MASTER BREAKER switch must be "on" to supply power to the washdown switch. To operate the washdown pumps, place switch in the "on" position. Raw water flows from the seacock, to a strainer, to the pump and finally to the washdown outlet and hose. The pump will shut off automatically when the hose nozzle is closed and pressure builds. Check the strainer regularly.

The washdown may be used when a source of clean freshwater is not available. After use in salt water or brackish water, wash the boat with freshwater upon return to the dock or slip.

Courtesy Lights

The cockpit courtesy lights are controlled by a toggle switch on the dash panel. The MASTER BREAKER switch on the DC panel must be in the on position to supply power to the light switch. Additional circuit protection is provided by a resettable circuit breaker located on the DC panel.

Covers

Side curtains partially protect the helm area from inclement weather. The aft camper covers the cockpit area.

Refer to Section 8, paragraph "General Care and Cleaning", for care and cleaning of covers.

Refrigerator

The refrigerator operates from 12 volts DC while underway, and from 115 volts AC during shore hookup. The REFRIG circuit breaker, on the AC Power No. 1 panel, must be "on" for AC volts refrigerator power. The MASTER BREAKER switch on the DC panel must be "on" for unit operation while underway.

See the refrigerator information in your skipper's kit.

Spotlight

The spotlight remote control spotlight is a spotlight and floodlight combination mounted on the top rail of the bow pulpit. The MASTER BREAKER switch must be on to operate the spotlight.

The light is controlled by a switch, a joy stick and a rheostat located on the dash panel (see Section 3). The circuit is protected by a resettable circuit breaker near the switches. The three position switch functions are "off" (middle position), "flood" (floodlight effect), and "spot" (spotlight effect). The joy stick moves the light up, down, right or left. The rheostat controls the speed of light's movement.

See spotlight information literature in the skipper's kit.

Stove

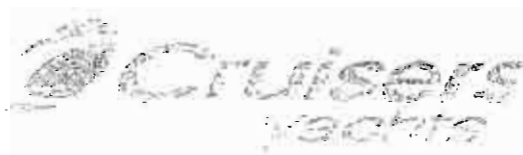
The single-burner electric stove gets its power from 115 volts AC shore hookup only. It is protected by a circuit breaker in the AC master panel marked STOVE and by a safety switch on the stove.

Trim Tabs

The two trim tabs, located on the transom, help to correct the attitude and control your boat. The tabs are controlled individually by rocker-type switches located on the dash panel (see Section 3). A resettable circuit breaker located on the dash circuit breaker panel protects the circuit from an overload. Push rocker switches in only half second intervals to avoid over correction.

The trim tab pump is located in the engine compartment (see Section 2). The trim tab system uses Type A Dextron II automatic transmission fluid.

Refer to "Suggested Maneuvering Techniques" in Section 5 of this manual for information on trimming your boat. Also check your skipper's kit for further information on the trim tab system.



Air Conditioning/Heater Unit

The air conditioning/heating unit consists of a heat pump unit and a seawater pump. The unit and pump receive 115 volts power from shore hook-up or the auxiliary generator (if installed). The seacock must open and the AIR CONDITIONER circuit breaker, located on the AC Power No. 2 panel, must be "on" to operate the heating/cooling system. Refer to the air conditioner owner's manual for operating instructions.

The air conditioning/heating unit is located in aft cabin/storage area and cools/heats the cabin, galley, and stateroom areas. The controls are located to the port side of the cabin entryway. The supply vents are located in the galley area.



CAUTION

Do not block return air grille. Airflow restriction will occur, causing inefficient operation and unnecessary strain on the system.

Raw water is drawn from the seacock, through a strainer and to the pump. The pump supplies the unit with a continuous flow of water in heating and cooling modes.



CAUTION

Inspect and clean strainer regularly; damage can occur to pump or compressors if the units do not receive a sufficient flow of water.

Refer to the heat pump manufacturer's manual in the skipper's kit for complete operation and service instructions.

Carbon Monoxide (CO) Detector

The carbon monoxide detector warns of carbon monoxide in the air and tracks the level over an extended period of time. The detector, with visible and audible alarms, is mounted in the cabin area and operates on 12 volts DC (see Section 2, paragraphs "Below Decks").

Refer to your skipper's kit for carbon monoxide detector operating instructions.



Microwave

The 115 AC volts power to the microwave receptacle is supplied by shore hookup or the auxiliary generator only. The microwave is protected by a circuit breaker in the AC Power No. 1 panel marked MICRO.

Refer to the booklet in your skipper's kit for complete operating and care instructions.

Ice Maker

The 115 AC volts power to the ice maker receptacle is supplied by shore hookup or the auxiliary generator only. The ice maker is protected by a circuit breaker in the AC Power No. 1 panel marked ICE MAKER.

Engine Hourmeter

The hourmeter registers accumulated engine operating time, and is activated when the ignition switch is in the "on" position. The engine hourmeter is used to keep an accurate log for scheduled maintenance, and to determine rate of fuel consumption in gallons per hour.

Synchronizer Gauge

The synchronizer gauge compares engine speeds. When the needle points to zero, it means the port and starboard engines are running in sync with each other. When the needle points to the left or the right of zero, it means one engine is running at a higher RPM than the other. Correct the situation by either increasing or decreasing the throttle on one engine or the other until the gauge indicates zero.

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Section 10 – Troubleshooting

TROUBLESHOOTING	10-2
Engines	10-2
Electrical	10-4
Plumbing	10-5

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TROUBLESHOOTING

The following charts will assist you in finding and correcting minor mechanical and electrical problems with your boat. Contact your nearest authorized Cruisers dealer for problems and procedures requiring the skill of a trained service technician.

To correct a problem, first determine what the problem is. Then eliminate the simpler causes, working to the more complex causes.

Engine and Power Train

NOTE

For further troubleshooting information other than given here, refer to the engine owner's manual in the skipper's kit.



WARNING

Disconnect battery cables before making checks or adjustments around engine and electrical components. Personal injury or damage to the boat may occur.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Engine will not start.	Fuel valves are closed or fuel tank is empty.	Open or replace fuel lines, or fill tank. Check or clean anti-syphon valve.
	Contaminated fuel.	Check fuel for contaminants or water. If fuel is contaminated, drain tank and lines, flush with clean fuel and replace fuel filters. See Cruisers Dealer for service.
	Loose wiring or bad key switch.	Look for any loose connections. Contact technician to replace switch if necessary.
Low starter speed.	Weak or bad battery.	Have battery tested or charged.
Starter will not turn engine crankshaft.	Corroded battery terminals.	Clean terminals.
	Loose wiring connections.	Clean and tighten all wire connections.
	Weak or discharged battery.	Charge battery.
	Defective starting switch.	Contact authorized dealer for switch replacement.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Lack of power.	Throttle not fully open.	See authorized dealer for throttle linkage adjustment.
	Contaminated fuel.	Drain fuel tank and lines; flush with clean fuel and replace fuel filters. See Cruisers Dealer for service.
Erratic engine speed.	Plugged anti-siphon valve. Pinched or clogged fuel lines or tank vent line.	Replace line or remove obstruction. See Cruisers Dealer for service.
	Contaminated fuel.	Drain fuel tank and lines; flush with clean fuel and replace fuel filters. See Cruisers Dealer for service.
Engine overheats. (Fresh water cooled engines only.)	Engine cooling water seacock closed or water pick-up is blocked.	Open seacock or remove obstruction.
	Leaking or pinched water lines.	Repair or replace water lines. See Cruisers Dealer for service.
Excessive vibration.	Foreign objects obstructing the propeller.	Remove objects from prop by reversing prop or cutting and pulling away obstruction.
	Bent prop.	Replace prop.
	Engine not timed properly or misfiring.	Have engine tuned-up by an authorized dealer.
	Worn engine bearings.	Bearings replaced by authorized dealer as necessary.
Poor performance.	Boat is overloaded or weight is badly distributed.	Reduce overload or distribute load evenly. Trimming the boat will also help.
	Material wrapped around the propeller.	Run prop in reverse or cut and pull material from prop.
	Damaged or use of wrong propeller.	Inspect propeller; replace as necessary. See Section 8.
	Boat hull has marine growth on it or hull is damaged.	Clean or repair hull as necessary. See Section 8.
	Excessive water in bilge.	Pump water out and inspect hull for leaks.

Electrical

NOTE

For any troubleshooting information other than given here, refer to the individual component owner's manuals in the skipper's kit.



CAUTION

Never reset a circuit breaker which has been automatically tripped without first locating and correcting the problem.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Electrical component will not function.	Circuit breaker in the tripped or "off" position.	If breaker is tripped, correct the problem and reset; otherwise turn circuit breaker
	Weak or discharged battery.	Charge battery.
	Loose or broken wire connection.	Connect or repair wire as necessary. Install plug in outlet.
Lights do not come on or are dim.	Circuit breaker in the tripped or "off" position.	If breaker is tripped, correct the problem and reset; otherwise turn circuit breaker "on".
	Weak or discharged battery.	Charge battery.
	Loose or broken wire connection.	Connect or repair wire as necessary.
	Light bulb burned out.	Replace bulb.
No power at AC outlets.	Ground fault circuit interrupter tripped.	Reset button on outlet and test. If reset button or light does not come on, DO NOT use any outlets. Have circuit checked by qualified technician.

Plumbing

NOTE

For any troubleshooting information other than given here, refer to the individual component owner's manuals in the skipper's kit.



CAUTION

Never reset a circuit breaker which has been automatically tripped without first locating and correcting the problem.

PROBLEM	POSSIBLE CAUSE	SOLUTION
No water from cockpit wash-down when turned on.	Seacock closed. MASTER BREAKER switch in the "off" position. Washdown switch "off". Strainer or hull inlet plugged.	Open washdown seacock. Place MASTER BREAKER switch in the "on" position. Flip switch to "on". Clean strainer or remove obstruction from inlet.
No water at showers or sinks when faucets are turned on.	Pump's automatic shut-off is defective. Freshwater tank is empty. MASTER BREAKER switch in the "off" position. Pump is defective.	Have washdown pump checked by authorized dealer. Fill freshwater tank. Place MASTER BREAKER switch in the "on" position. Have pump serviced by authorized dealer.

Plumbing (continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
Low water pressure at all showers and sinks.	Water system has lost its charge.	Check for leaks in water system. See Cruisers Dealer for service.
	Weak or worn pump.	Have pump serviced by authorized dealer.
Low water pressure at only the shower or the sink.	Restriction or obstruction in water line.	Clean, repair, or remove obstruction from water line.
Head will not flush.	Flush water seacock not open.	Open seacock.
	Inlet pedal valve not working.	Have head serviced by authorized dealer.
Head will not empty.	"Y" valve not open or line to holding tank is blocked.	Open "Y" valve or remove obstruction.

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LIMITED WARRANTY

REGISTRATION OF PURCHASE: The "Federal Boat Safety Act of 1971" requires all boat manufacturers to maintain a record of all first retail purchasers and their current address for the purpose of notification in case of defective parts or equipment, or in case of non-compliance with standards or regulations set forth by this act. Failure to complete and return your factory warranty card for our records will waive your right to notification of defect and/or repair at manufacturer's expense. **THIS LIMITED WARRANTY CAN BE ACTIVATED ONLY BY SUBMITTING THE "LIMITED WARRANTY REGISTRATION CARD" TO CRUISERS WITHIN THIRTY (30) DAYS OF THE DATE OF PURCHASE.**

WARRANTY COVERAGE: CRUISERS, a division of KCS INTERNATIONAL INC., warrants to you, Consumer, subject to the limitations and exclusions described below, that those parts of the new boat manufactured by CRUISERS, and purchased from an authorized Cruisers dealer, are free from defects in material and workmanship under normal use and service. The duration of this warranty is as follows: (1) The structural sections of the hull and deck for a period of 5 years beginning the date of delivery to the first consumer. (2) As the other parts and components manufactured by CRUISERS for a period of 1 year beginning the date of delivery (except for exclusions listed below). (3) CRUISERS warrants the gelcoat finish below the waterline against blistering for a period of 2 years from the date of sale, provided that the bottom of the boat is maintained.

WARRANTY CLAIMS PROCEDURES: If a defect is discovered during the applicable warranty period, Consumer must promptly notify the selling dealer (or CRUISERS) of such in writing. In no event shall such notification be received by the dealer (OR CRUISERS) later than 30 days of the discovery of the defect. All warranty claims must first be made to the dealer from whom the boat was purchased. The dealer will contact CRUISERS, who at that time will determine whether the defect is covered by this limited warranty and advise the dealer. For warranty service, the boat must be returned to the selling dealer or if determined by CRUISERS to our factory. A boat may not be returned to the factory unless prior written authorization, in accordance with instructions set forth in CRUISERS return authorization, from CRUISERS SERVICE MANAGER. Transportation, preparation, disassembly and reassembly cost to and from the dealer or CRUISERS will be the responsibility of the owner.

REMEDY: Within a reasonable time after notification, CRUISERS will repair any defect in materials or workmanship or at its option, correct such defect by replacing nonconforming goods or parts. Such repair and/or new parts are warranted for the unexpired portion of the original warranty, or for 90 days, whichever is longer. Warranty work (parts and/or labor) shall be at CRUISERS expense. These remedies are the Consumers exclusive remedies for breach of warranty.

LIMITATION AND EXCLUSIONS: This warranty applies only if the boat is used under noncommercial normal use and service, and shall not apply to the following: (1) Boats subjected to negligence, abuse, misuse, or accident. (2) Boats subjected to improper operation, trailering, maintenance or storage, commercial use or use for purposes other than those for which the boat was designed. (3) Defects or damages caused by a force or impact which exceeds design specifications, including but not limited to, exposure to harmful solvents and electrolysis. (4) Defects or damages caused by unauthorized attachments or modifications. (5) Any statements, representations or warranties given by dealers or third persons other than those provided within this warranty. (6) Any unit which is part of a rental fleet, used for racing or commercial purposes. (7) The following consequential damages: (a) loss of time, (b) inconvenience, (c) towing charges, (d) expenses for travel, lodging telephone and fuel, (e) loss or damage to personal property or loss of revenue, (f) loss of use of the boat, (g) haul outs, launch, lift charges. (8) This warranty specifically does not apply to engines, stern drives, transmissions, generators, propellers, improper adjustment of controls, adjustment or realignment to any components including, but not limited to the drive train, and any other parts expressly warranted by the manufacturer thereof. (9) Also excluded are gelcoat cracking, gelcoat crazing, gelcoat fading, stainless steel hardware, windshields, glass breakage, all vinyl upholstery, cockpit seat wood, acrylic top enclosures, carpet, electronics, gauges and other equipment or accessories manufactured by manufacturers other than Cruisers, which are separately warranted by such other manufacturers (appropriate adjustments therefore being provided by their respective manufacturers). (10) Any published or announced catalog or performance characteristic of speed, fuel and oil consumption and static or dynamic attitude in the water. (11) Cruisers shall not be effective or actionable if any repair or replacement work is performed by any unauthorized party.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESSED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DO NOT EXTEND BEYOND THE DURATION OF THE EXPRESS WARRANTIES PROVIDED HEREIN.

IN NO CASE SHALL CRUISERS BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES BASED UPON BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT, OR ANY OTHER LEGAL THEORY. THIS LIMITATION DOES NOT APPLY TO CLAIMS FOR PERSONAL INJURY.

SOME STATES DO NOT ALLOW THE EXCLUSION AS LIMITATION OR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

TRANSFERABILITY: All rights and terms of this limited warranty may be transferred to new owners of the covered product by completing a TRANSFER OF WARRANTY FORM and submitting it to CRUISERS.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

CRUISERS reserves the right to improve its products through changes in design and/or materials without being obligated to owners of boats of similar or the same model or prior manufacture.

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